

AVIATION WEEK

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SEPT. 29, 1952

50 CENTS

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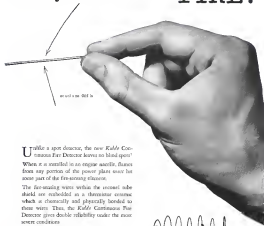


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Aviation Week

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Domestic

Baldy Co., one of the world's largest parts and equipment firms, has entered into arrangements to sell all its stock to Alfa Corp. in an associated company. Fred O'Brien, president of Alfa, says that Charles Baldy will continue, in kind of the business and Edward H. Ford will stay on as manager of its eastern branches.

U. S. air services have received more than 10,000 orders, places orders, the network of Korean headquarters, according to Aircraft Industries Assoc. "AIA also says the aircraft industry will reach its peak in December 1957, with deliveries between 1,000 and 1,300 planes monthly, although airplane weight subject still continues to rise.

Don Flower, general sales manager for Convair Aircraft Corp., Wichita, Kan., for 12 years, has resigned "for personal reasons." Sources close to Flower say he will have a vacation then possibly take on a Convair dealership or distributorship. Ralph Pfund, assistant sales manager, also has resigned to take over a Convair distributorship.

New assembly order made of 12 to 17" fuselage section for 128th F. Squadrons will flow a B-47-41 from F. Ward, Tex., to Rogers Field, N. Y. Sept. 17. Delivery is 1,234 and previous record 507.4 sec was set in 1946.

Col. James M. McDonnell, USAF (Ret.), chief aviation consultant to the commanding general of the Eastern Air Force, died Sept. 16 at N. Y. An aviation engineer, McDonnell was associated with the Air Force for 40 years. He was 64.

U. S. coal plane exports of 1,000 lbs. or less totaled 25, valued at \$10,120 during August, compared to 230 lbs. smaller air planes, exported in the first eight months of 1952.

Reg. Gen. John W. Sweeney, Jr., deputy for development of the Air Force and Department of Defense, was named commander general of the 11th Air Force with headquarters in Meade, Md. when Maj. Gen. Vincent Mason, who has been appointed deputy chief of staff for the Air Force, has been named.

Trans World Airlines' flight engineers have set strike date Sept. 25, when they will walk off the crew's domestic and



BOMBING B-47 TAKES ON TURN, while in flight, a B-47 bomber, banking in the extreme right position. This is the first photo to show the 600 mph. plus B-47.

Strategic being refueled aloft. Techniques under study a B-47 bomber in the B-47's striking position. Bombers are the B-47's striking position.

international services. The engineers have been negotiating since their contract expired in May. Original strike date was Feb. 10 but was postponed with formation of a Presidential emergency board. That is said to be wages. The board recommended a 10% increase which has been turned down by the flight engineers.

Miami International Airport's 55-ft. 110-ton traffic control tower has been erected more than a mile from its present location to meet the airport's 5,000 ft. runway.

Albert E. McPherson, 44, scores of years aircraft structures group, National Bureau of Standards, died at his home near Washington, D. C. He was secretary of the Society for Experimental Stress Analysis.

Reck Nelson has delivered its first jet supply aircraft engine to the Air Force. The firm is building the engines under license from Wright Aircraft Co., Dayton.

Aerobics under administration of Aero Industries Inc. (Aerobics) will meet with industry representatives in Oct. 7-8 at the final of a proposed specification which covers airline transport order.

Range-finding radar target, seating 40 passengers, is depicted in artist's sketch created in recent B-47 Helicopter, Inc., house organ. Craft has a single two-blade rotor with large target engines at tips. Landing gear is retractable.

Financial

Northwest Airlines, Inc., Minneapolis, Minn., has total net cash 10% of

total of record on Oct. 7.

Lockheed Aircraft Corp., Burbank, Calif., reports sales of \$158,220,000 during the first half of 1952, a 92% increase over the same period last year. After provision for federal taxes, earnings were \$2,618,000. Bookings for increased 22% to \$1,519,964,000.

Northwest Airlines has delivered eight aircraft chartered of 241 units per day on its 4.5% convertible preferred stock, payable Nov. 1 to holders of record Oct. 28.

International

American Guard, Mexican airline, reportedly plans to buy an additional number of Lockheed Hercules transport aircraft for operations from Mexico City to New York.

BH Vietnam all-weather jet fighters have been ordered by Sweden. They will be fitted with Swedish-built de Havilland Ghost engines.

An Airline, with backing from Air France, last month opened a new air service between Melbourne and Conde, France. French West Indies. Three flights a week are being made.

So Miles Thomas, chairman of Republic Computers Agency, Corp., is quoted as saying that his outfit would serve this American World Airlines to help DH Company absorbed to BONE to help export sales.

Quantum Engines Airways have generated all DH Travelers from time to time following a series of cut under financial conditions.

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AVIATION CALENDAR

- Sept. 20-Oct. 1—National Electronics Convention, Sheraton Hotel, Chicago.
- Sept. 26-Oct. 1—Aircraft Spark Plug and Ignition Conference, sponsored by Champion Spark Plug Co., Toledo.
- Oct. 1-6—Society of Automotive Engineers annual aeronautics meeting, aircraft engineering display and aircraft production round, Hotel Statler, Los Angeles.
- Oct. 2-5—Capacitors Aircraft Division—Ann 4th annual meeting and luncheon, Racine Hotel, Chicago.
- Oct. 2-Mechanical Electrical Security annual display meeting, Pan Pacific Auditorium, Los Angeles.
- Oct. 9-10—Airport management operations conference, Delmonico University.
- Oct. 13-15—Fourth annual AIR-Ten Air-Ten information available from Texas Aeronautics Commission, Austin.
- Oct. 18-24—American Welding Society national fall meeting, Bellevue Sheraton Hotel, Philadelphia.
- Oct. 24-Nov. 2—International printers and travel exposition, New York, Chicago.
- Oct. 26—Los Angeles International Airport Air Fair and Open House, Los Angeles.
- Oct. 28-30—Transportation Aircraft Education Systems Conference, sponsored by Veda Inc., Inc., Hotel Park Sheraton, Detroit.
- Oct. 28-30—AEE Air Transport Committee annual meeting, Commodore Perry Hotel, Toledo.
- Oct. 29-31—AEE conference on machine tools, The Ritz Hotel, Albany, N. Y.
- Nov. 6-7—National Aids and International Security of all American Engineers, The Mayo Hotel, Omaha.
- Nov. 7-12—Symposium on transportation in today's Western Union Auditorium, New York.
- Nov. 10—National Automobile Tool Engineers conference, University of Illinois Urbana, Ill.
- Nov. 11-12—Power distribution annual meeting, Lock Haven, Pa.
- Nov. 13-15—Aeronautical Society of America Symposium on aircraft noise, Sea Dipp Club (for details write ASA, 57 E. 33 St., New York 17).
- Nov. 17-20—National Aeronautics Trades Association annual convention, Hollywood Roosevelt Hotel, Los Angeles.
- Dec. 1—Symposium on light metal heavy designs and experience for aircraft, RAE AGVE, INS and AIME.
- Dec. 2-5—Aviation Distributors and Manufacturers Association annual meeting, The Americana Hotel, Miami Beach.
- Dec. 12-13—Joint AEE-IEEE ACM conference on electronic computers, Park Sheraton Hotel, New York.

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FRANCIS AIRCRAFT—Left photo shows large ten turbo-propeller B-24 Francis flying low making its golden debut at 10,000 feet; show-through England. Spent 270 lb. the Francis can just up to 105 passengers. Two other Francises are being built, but reports are that they will be used as spares to keep the first three

DELTA BOMBER EMERGES—New Avco 408 delta bomber (right) was close up as it was taken out of the factory for the first time in a long time. The delta bomber on the wing near the fuselage payload box of the craft's on board. Design philosophy behind the 408 was covered in Aviation Week Sept. 22, p. 12.



Foreign Planes Show Their Stuff

CF-100 HEADS MYRAID—Several all-weather Avco Canada CF-100 fighters at a steep angle. The superb, multi-packed fighter is powered by two Avco Canada Orenda jets. The company is opening a new jet engine plant at Malabar, Ontario, Sept. 29.

Post-Mobilization Planning

Washington is catching steam from defense buildup to the anticipated lockdown. The toppling-off in military branches should start in mid 1951. For the aircraft manufacturing industry generally it isn't expected to be felt by any substantial degree until 1955.

• New vice chairman of the President's Council of Economic Advisors, Robert Tanner, has been assigned the task of drawing up a blueprint for orderly transition of defense industries to commercial production.

• Secretary of Commerce Charles Sawyer is in the picture, too. A 19-member advisory committee of outstanding individuals recently appointed by the Secretary, working in collaboration with the Committee for Economic Development, is due to make a report Jan. 3. Its objective will be to ferret out defense commodities which require information on customer or potential markets for commercial items.

• Munitions Board is drawing up plans for industrial defense capacity that won't be needed in production in the level-off period.

The original plan to keep three times the industrial capacity required for current production in the level-off period as operations on a one-shift (or two shift) basis so that output could be tripled at the push of a button—this it would be too expensive.

Munitions Board is drawing its plans on these two assumptions:

• One a fraction of the capacity that will become surplus in the level-off period will be kept in "plant life" status so that it could be promptly substituted as needed.

• In the major portion of facilities, production decreased equipment will be moved to one side in control space and most of the floor space of the plant retained for commercial production.

The board points out that having production facilities in the actual plant where it would be needed is even if an emergency would be an overwhelming advantage to having it located in government warehouses at some casual the expense. "The advantage the board feels, not weight the additional expense."

New Production Boss

Munitions Board, which sees no recession under the 1947 Uniformed Act has been publicly rebuffed in report based by the military services, in taking over its new role as top boss of the military production program with determination.

• Up to now the services have decided what should be done, done it, and generally, long after the fact, notified Munitions of the results. The board could do some good to the Secretary of Defense. That usually, by the time the chairman of the board found out what was happening, it already had occurred.

• What does one on the Munitions Board chairman at the vice chairman will make the difference. The services will have the right after the fact to appeal to the Secretary.

Munitions Board is now preparing no analysis of specific expansion effort. For example an order regarding the services to get explicit approval of the board in any expansion of aircraft or other production expansion is on its way.

Levent's organization that the board was more in two feet a down in the actual spelled out in his function. Implementing decisions will be made only so fast, and will cover only so much ground, as will permit of adequate preparation for and actual execution of the work involved.

The new top-side authority over military production (Munitions Board) adds up to two men.



John D. Small

John Houston

• John D. Small, chairman, "topological" Small served as director of the old Army Navy Munitions Board and as executive officer of the War Production Board during World War II. Later he became administrator of the Civilian Production Administration, which supervised the WPB and then, vice president of Emerson Radio and Photograph Corp.

• John Houston, vice chairman. Formerly deputy administrator of Civilian Production Administration, he has had industrial experience in an effort of R. P. Adams Co. and Boston Manufacturing Co. Before coming to Munitions a year ago, he served as assistant to presidential secretary, Dr. John Stachurski.

Other members of the Munitions Board are representatives of the services. It is Small—on, in his absence, Houston—who now can make decisions for the board.

Small and Houston plan to work closely with former General Motors vice president, Hugh Downs, now "traffic" director, assigned to Levent.

The 1947 Uniformed Act gave Munitions Board sweeping authority over military production. There are the provisions of Levent's "charter" that, for the first time, bring the military to the board.

• Power of decisions. Munitions Board chairman, or vice chairman, now can unilaterally make a binding decision on any aspect of the military production program, subject only to veto by Levent.

• Lullies, though. Munitions Board has complete authority to "order" its divisions what they are implemented by the military services.

• Legal personnel. Subject only to approval by Levent, chairman of the Munitions Board can take action against persons from any of the services for crimes. Being civil with the board, this action personnel will try to be responsible to the service personnel of their services and their efficiency efforts, for production purposes, will be in the board chairman. This risks out the big drawback to an effective Munitions Board operation in the past. Military personnel have been selected for assignment to Munitions by their own service and remained prejudiced by their service.

—Katherine Johnson

Plan to Reshuffle Air Production Fizzles

• APB backs away from proposals of its acting chairman; reaffirms faith in Munitions Board schedules.

• Dr. T. P. Wright makes new recommendations to board, warns against overzeal in reducing plane types.

By Associated Press
Washington Staff

You didn't hear that last, delayed action explosion in the U. S. military aircraft production program in Washington last week.

Actually the explosion was a fizzle.

A meeting of the Aircraft Production Board Sept. 19 quietly backed away from the revolutionary recommendations made by acting chairman W. L. Campbell last July 9 to reduce virtually the entire aircraft program, canceling many large contracts and making new planes still on paper into large-scale production.

Instead, APB merely reaffirmed its faith in Munitions Board (Air) and Vague Schedule 14 and specifically decided against any Campbell recommendations for concentration on fewer types of engines.

Behind this action was the concept of an "old plan" as the aircraft production planning field. Dr. T. P. Wright, now president of General Electric and director of World War II's Aircraft Production Board, "Tad" Wright had been asked to be a consultant to the current APB as the aircraft program and to make a completely objective report about what should be done.

• APB Acts—Three top specific actions were taken by APB.

• New will continue Washington 140 engine development and study for possible production from Westinghouse and General Motors.

Campbell had recommended the engine be canceled because of production difficulties, with comment of other engineers—Albion J71-A5, General Electric J71-A3 and Pratt & Whitney's J57 series—no plan for which the J40 had been intended.

• Air Force will continue Curtiss-Wright development of the Brevet-designed Sapphire J55 engine and push for its increased production, both at Curtiss-Wright and Rockwell (Campbell report had also recommended canceling the Sapphire for replacement by the other three engines named above).

Seems close to APB told Aviation Week that a Brevet report from Wright to Campbell had been circulated generally through the APB staff and Defense Department and had been generally accepted as a sound approach to the program problem. Indeed that report was the nation's 20 years experience as an aircraft engineer, designer and production expert before he entered government service, and his continued familiarity with new aircraft developments maintained as a member of the National Advisory Committee for Aeronautics since he went to Council.

Fiasco of the Wright report was seen by the fact it was accepted by the board, including Campbell, who had appointed Wright to prepare it in the first place. Furthermore, APB was well enough satisfied with the Wright



WRIGHT Sound approach to production

working job on the problem that it designated him as coordinator in working out a project—graded matter. The report also will go to Campbell.

Leaders for the Campbell report had been focused in Defense Department from the day of its disclosure in an exclusive Aviation Week story (July 28, p. 12).

• Campbell Report—Generally, Campbell had reported Air Force and Navy to concentrate on up-dating their long standing contracts for big winged fighters and bombers and their preceptors and reducing the number of types needed to accomplish identical missions.

• Campbell urged concentration on production of the new very advanced types, some of them not yet ready to fly.

He asked the board to make up of big civilian and military aircraft production planners of Air Force and Navy, to show, come Aug. 6 (later postponed to Sept. 19) who specific contract recommendations could should not be put into effect.

• Concentration of contracts for the new J55, Lockheed F94, Grumman F9F and T10F planes, and dozens of production facilities for these planes to build other manufacturing plants. • Cancellation of contracts for Republic F4C, North American F82, F82D,

[illegible]

• **De Havilland D-20.** Covered pilot and open passenger, 490 lbs. Pratt & Whitney A-50 giving delivery of the mail is smooth, mostly going to Kaseo, usually as a personal transport assigned to division level. Greatest alt about 134 mph. Hang: of about 5 sec. Much better tail than Army pilots say it is deficient in lateral control at slow speeds on final approach.

• **Cessna L-19 Bird Dog.** Standard military fuselage, lower, and articles of mail are placed along the right wing edge. Powered with 213 hp. Capable of 190 mph. Cruise 170 mph. Capable of short landings and takeoffs on small airports. Arrow has endorsed more than 2,000.

• **Booth L-23 Twin-Bonanza.** Six-place, powered with two 260-hp. Lycoming engines, 2,730 lb. useful load. Army has ordered 55 with first four due in January; preproduction machines now being flown for familiarization, will be assigned to army headquarters, or corps headquarters, for command transport assignments.

IATA Meets

- Protection of particular airlines is criticised.
- Transport group says it could lead to retaliation.

(McGraw-Hill World News)

Guaya-A total ban on local passenger services by some governments for some particular airline regions or routes, with out regard for the general international pattern, was criticised by officials of the International Air Transport Assoc., during the organization's eighth annual general meeting here Sept. 15-19.

These analytical effects could prevent steady development of new and higher capacity equipment being purchased in quantity by most owners and retard growth of international air transport. A big danger is that such methods could lead toward retaliation by other countries, thus bringing chaos to the world wide traffic system.

◆Highlight—Among other points emphasized during the summer economy

* Speaking up reduction of paper work necessary for international flying of passengers and cargo. The traffic committee noted that, "In many places still today, passengers are inconvenienced and airlines delayed by the imposition of quite painful formalities." Endorsement of proposals aimed at streamlining visa and police or security clearance for tourists and similar documents was also noted.

• Inclusion of the "self-and-report" option has improved passenger satisfaction procedures during the past year. Under this method, sickness estimates only provide space for passengers booked on their lines by other carriers without capacity for prior requests and coordination.

* Recommendations that tobacco and

points used in cotton, large birds and endocannage needles be impregnated with synthetic resin containing insecticide, thus cutting early ground delay for dissection of aircraft flying international routes. If the method were put into practice, aircraft material could be sprayed in flight with a small dose of Aerosol insecticide without its consequent loss of strength.

- Need for research on correlation between pilot age and fatigue. Studies indicate that pilots under 35 are more easily stressed than those between 35 and 45, but their crews, when made, are smaller. Other tests suggest that top-tier pilots between 35 and 40, now in command, take more time to recover from fatigue than captains over 40.

• Airlines should ensure their safety protection by emphasizing closely new performance requirements for future transport pilots. "The incorporation of airlines must take proposed government requirements is of vital importance. Every 150 ft of altitude allowed an aircraft is worth 1,000 lb. of payload to a certain type."

* Ministry requirements for both road testing and strongly opposed it was felt that designers should be given a free hand to choose the most efficient method of passage safety for the particular design they are considering.

On fully automatic loading equipment, it was believed that although sufficient expenditure of money and materials could solve the problem, "the number of additional loadings it would make possible might not make the cost."

- Commenting on the earlier Copenhagen studies on approach and landing and the technical committee concluded that present locations of ILS reference points about 750 ft. down the runway means that aircraft do not see a large portion of the first runway segment.

• IATA's legal committee invited new liability provisions now being discussed in Rome. Under the terms of this draft, the airlines would assume absolute liability for any damage caused to third parties on the ground, with liability reaching \$22,110 per person for the loss of life. Moreover, damage liability, even with the aid of the plane, would range from \$36,978 to \$737,600.

Jets for Mexico

Jets for Mexico

(McGraw Hill World News)

Mexico City—The Mexican Air Force has purchased its first jet aircraft—four single-seater Vampires and two two-place Vampire trainers—from de Havilland, Britain. The six planes will cost approximately \$700,000 and probably will be based at the recently completed new jet field at Santa Lucia, near the coast.

AVIATION WEEK, September 28, 1995



PEOPLE'S DRUMMAN BILLOUT runs down the steps of the US House of Representatives to bid a Communist heart. An MD code about means as as the standard raised

Navy Uses Obsolete F6F Drones

In announcing use of "robot" fire-bombers against badly defended North Korea ground targets, the Navy's Pacific Fleet recently won U. S. banner headlines. The fact that the Navy's robots were obsolete radio-controlled "drones" did not prevent the news from exciting in Americans public grown weary of constant U. S. losses in the conventional warfare of Korea while the military use of fire at home declared pathbreaking warfare to be just around the corner.

The drone launched from the Navy's *Avatar* B-52 was obsolete P6F Corsair was Hellicopt fitted with remote control, a television camera and a 2,000 lb bomb. They were guided to destruction of the targets by Douglas AD-2a with television camera.

New reports indicate that it has about 1,500 such drones available, but many are needed for intra-theater target practice—the original purpose for which the drones were developed and used before, during and after World War II.

► **Prockersown:**—The Navy's Bomber-bombed dinner attack is the first heavy-rail bombing since the Korean war outbreak. But Army Air Force and cruise B-17 bomber (without pilotage) against a few German installations back in World War II.

Another Navy official claimed that so sensitive the submarine guidance system was, "anybody could steal it. If someone...

complete description of Navy TV equipped down appeared in the Navy's July 1951 unpublished edition of *Navy*.

Aviation News: This account described how back in March 1942 "a top-secret, carrying TC-2 converted to radio control was equipped with a television type which transmitted a picture of the target back to the control aircraft and conducted simulated attacks on a destroyer moving at 15 knots."

WCA Contracts to Buy Lake Central

Western Central Airlines has signed a contract to buy control of the troubled Lake Central Airlines through purchase of the Western interests in that line at an undisclosed price. CAB just concluded oral agreement on its own charges that John Western's management of Lake Central has been guilty of financial and operating irregularities.

Lake Central over five DC is used on scheduled local service and one C-46 used as auxiliary charter flights.

Lake Central routes include from Indianapolis to Louisville, Cincinnati, Grand Rapids and Chicago. The acquisition would make WCA one of the largest local service lines serving 11,000 daily scheduled riders.

It would look WCA's action "with Lorette Inc., the home of Purdue University, with whom Wisconsin Central recently entered a multimillion-dollar equipment purchase contract," says WCA board chairman Arthur E. A. Mueller. It permits close integration of the local therapeutic system in contiguous Mid-west areas, he added.

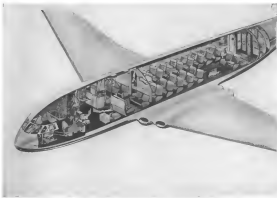
The contract is subject to approval of C&B and the company stockholders. Some observers expect C&B to make



BOEING XB-52 NEARS FIRST FLIGHT TRIALS

Bosang's XE-52, seen to be the second of the eight-pit bundles seen to fly, is shown here as it scored complete. The big craft is supported on jacks while its landing gear is installed (top). Note the unusual on-take covers on the paired Pratt & Whitney 117 turbines and the forward positioning of the engine pods. Generally, and those of the

plane over a large percentage of wing area (bottom). Large flaps extend down and fold in Fowler style; two flap segments are up. Upper flaps attached between 70 and 80% of chord. Flap portion is a three-section spoiler, and still further outboard of the trailing edge is the Rockwell wing fences.



COMET I: WORLD'S FIRST JET TRANSPORT, accommodates 44 passengers in this standard seating arrangement.

Designer Tells of Toil Behind the Comet

- Bishop's version of 'isolede story' is saga of a bold gamble to snare jet carrier lead for the British.
- Job took lots of advance planning by de Havilland and cooperation and confidence on the part of BOAC.

The de Havilland Aircraft Co.'s jet-powered Comet represents more than just a "first" in jet transport history. It was a bold—and successful—gamble to span the gap between the straggling, inefficient American land and the comparatively downbeat status of British aircraft projects.

We feel that we have a lead on the Americans of between four and five years in jet transport aircraft. That was true in about the same position as we were in 1946. That is the opinion of R. F. Bishop, director and chief designer of de Havilland.

How did Britain achieve this lead

and why did the first jet transport emerge as the Comet configuration? Bishop tells the inside story in a recent article prepared for the British public too, *The Aeroplane*, and the de Havilland Co.

► **Basic Thinking**—Bishop makes it clear at the outset that the Comet was a joint effort of the builder and the operator—de Havilland and the British Overseas Airways Corp. At the end of the war, the Americans had borrowed large and there seemed no point in bringing out a plane similar to the Lockheed Constellation or the Douglas DC-6—so even aircraft a little in ad-

vance of their jobs.

A civil transport built around the de Havilland "straight-flow" Goblin seemed a good bet. This engine, first put at the test bed stage, was a successor to the smaller "Goblin"—about which the company had learned a lot in the Vampire fighter.

De Havilland wasn't unaware of the road flow got with its promise of better fuel consumption, but at that time—1945-46—the configuration didn't seem sufficiently developed for civil application. Doing the most was to get an unadorned straight-flow block, topping the compressor for minor pressure and doing so still another problem not yet tackled. Bishop now takes a look back and praises the choice of the straight-flow engine. "Had we adopted an axial flow engine from the first we should not yet have got the Comet into commercial operation."

► **Initial Study**—First specification stud-



COMET I: First Comet flew July 27, 1949, less than three years after serious design work began. BOAC started proving flights in April 1951, passenger service May 2, 1952.



COMET IA: First of this series flew in Canadian Pacific Air Lines' colors. Gross weight of this model is 110,000 lb., compared with Comet I's 105,000 lb., and fuel capacity is higher.

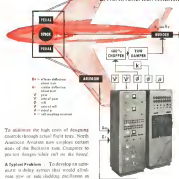
COMET II: This more powerful model, with four 5,400-hp.-thrust Rolls-Royce Avon engines, first flew in the air Feb. 26, 1953. It is designed for longer stages than the Comet I.



Here's how the **BECKMAN EASE COMPUTER**
helped simplify F-86 Sabre jet design

Author

at North American Airlines



To **alleviate** the high costs of designing aircraft through actual flight tests, North American Aviation now employs certain staff of the Buckeye team. Computers to **emulate** designs which will fly in the lower

A Typical Problem: To develop an automatic delay system that would eliminate give or take docking conflicts in joining the FMS D-Subs in over a wide range of speeds and at altitudes from sea level to the tropopause.

new North American Beloved II. The display above shows how North American users used various sizes of the Belvedere case. Computer to quickly solve the problem by flight simulation. A cost-effective cockpit was designed by engineers at North American which generated various proportions in a design and rather disconcerting was by movement of cockpit seat and pedals. These solutions were fed into the computer so that its abstract responses were analogous to the response of the F4U or F16. Flight loads were computed and attitude were noted on the computer by merely turning knobs.

Airborne performance confirmed the results as developed by flight simulation

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Sue, Wing Schemes—When students first took shape the plane was seen as a quadrilateral with a few lines roughly equivalent to the DC wing to handle about 24 passengers—but further study brought the realization that a larger form for about 60 passengers was needed. A 40-ft, 100-ft wing was chosen, and the question whether to use a wing that accounted high aspect and elements of the biplane and elevator. This also was one of the third's problems as higher displacement so the company decided to stick the configuration as in adoption of the Vampur. This, mirrored in the D80 129 and the

Although the study produced valuable information, it was deemed not fit to follow here "based on our knowledge, it just may" wouldn't be as practical and economical as a more conventional plan. And too much time could have been wasted with the study to apply the results to the proposed jet engine.

Design to Production—A key aim of the project was to go directly from drawing board to production. This meant creating sufficient advance thinking to limit the delays with the jet component coupled with enough realism to meet environmental extremes. One important endeavor was to attain a maintainable wing loading. As the Comet design emerged it was seen in 1946 as having enough stretch to incorporate the axial-flow engine with its greater power and economy, when it could be developed for civil applica-

Boskov gets credit to BOMC for making it possible to skip the auctions by getting the Soviet info production. Of course, there were declassified quantities—practically dozens, date and price. The 16 places involved 14 for commercial service and two development jobs for the British government based on 1946 prices weren't a break-even quantity for the declassified. But it was a starting order and as such was considered a profitable job as well as a money-maker.

- Progress: Data-Space between devices

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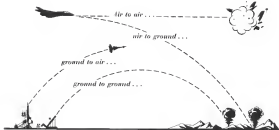
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Douglas Guided Missiles

Increasingly requested by the nation's defense, guided missile research and development has been a vital project at Douglas for more than ten years.

During this time, Douglas engineers have helped develop missiles for both Army, Outfitters and Navy—the all have

never been to be developed from planes at ground—some from the ground at surface targets—some from the ground at surface targets. Douglas has contributed to the success of automatic control, guidance, propulsion, and systems and structures.

—and has developed automatic components needed in guided missile design. Development of new guided missiles is further evidence of Douglas leadership, and now that the time to produce missiles in quantity has come, Douglas remains being still a ready for the job.



Depend on **DOUGLAS**



First in Aviation

start September, 1946; and the first flight (July, 1947) was less than three years. In 11 months the Star Comet evolved by 324 flight hours. One year after the Comet's first flight, the second stage took to the air. With this plane, KMAC began major production runs in April, 1951, getting on 500 in six months. In another six months—April, 1952—the Comet was having proven p.p.s. (Bulley's opinion: "Cautious and we wanted for a prototype so far before starting production we should have added at least two years to the overall time of getting into service.")

• **Rodas' View**—In getting the Comet to the point where actually some major design problems that had to be turned back and forth, then solved. Empty weight was one of the first. Because payload would be little more than 1000 lb. of fuel, the gross weight was not as large as the (and equipment) weight to a minimum. Fueling diameter adapted was the smallest compatible with passenger comfort in the arrangement of two on each side of the aisle.

Rodas, too, was used for structural bending. This concern had been explained in the earlier Doves, and the development had extensive experience with it. In the Comet it was applied to both the wing and fuselage, including double cantilever applications. In the wing, extruded but sections were replaced in the air to permit higher allowable compressive stresses in the skin stringer combination. The rivets making well fitted the vehicle for the integral fuel tanks.

• **kept Doug Brown-Doug** solution was another factor. The aircraft then was embedded in a thickened cloud of 1115, nitrogen was used, and soon was fitted into the fuselage bay. To give the fuselage some such a window, as Rodas had conducted tests with a special nose on a Hines glider. The test established that views were adequate.

The passenger-ride relationship was another worry. Cabin heating and ventilation was considered a vital job because outside temperatures would be as low as -70°C at 40,000 ft. Transporting the engine compartment by hot air under pressure was the answer, eliminating cabin blowers and cabin heating boosters.

• **Fuelage Strength**—Cabin differential pressures were needed, rather than on existing transports and to insure a certain failure in pressurized areas. Rodas was the fuselage "had to be designed rather like a submarine." In each test more or less present on the large fuselage section, a failure indicated that the side wall pressure was to use water pressure in a submerged section. In addition to the stress afforded, the failure could be located, whereas with air

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prevent the disruption made difficult to determine failure origin. Every part of the pressure vessel was tested to destruction.

Preventive actions were designed to considerably lighten strength than required by regulations. Needing a cubic differential pressure of 81 psi, the Hotfield designed to 241 psi and subjected test pieces to 161 psi. Damage was limited to 17 psi. Welds got special attention, being checked to 52 psi—a safety factor of 10. Average results were made for any of the four. Checks to maintain tubes pressure up, and doors and hatches were designed for manual opening.

► **New Materials**—Cold testing of materials to check its behavior at the low temperatures of the higher altitude, came in its special attention. The Hotfield put together a chamber to take the full diameter of the Comet and insulated conditions for 70,000 ft and temperatures down to -70°C.

Bebb says: "We soon found that the standard materials used for such things as big tanks flexible hoses, etc., were useless and a great deal of development work was undertaken before we were able to obtain materials which would require reasonable flexible after working for 10 or 15 hours at such temperatures."

► **Controls**—Power operated flying controls were used, each having balanced power actuators for the designers. Bishop reveals that they were able to put in 200 lb. of drag with the last Comet in the last six months of tests. He says: "I am convinced that had we had almost automatically balanced controls we should have spent the most of this time, getting the controls right."

The big advantage of a power control system, he points out, is that it can be properly adapted to a given task. For example, controls with larger chord, larger angular travel. As a power control system, the hydraulic lines and valves are duplicated. Primary system operates ailerons, elevators and rudder. A secondary system takes care of the landing gear and flaps. For thrust controls, three separate independent power units are available.

► **Safety Ideas**—Obviously, fire precautions came in for special attention. The parts of the burned engine have steel housings for protection from the main structure and the jet engine is surrounded with a steel tube carrying cooling air (American Wire, Aug. 25, p. 21). Clowrence on jet engine fire risk. Bishop stresses the great need for a schedule review of quick decisions although he does not indicate what approach has been used in the Comet.

On fuel safety, he is very definite: "I am convinced that one of the biggest steps forward in safety has been to use a fuel system of the type (detonated) instead of petrol (ignited). I hope that there will never be any talk of using in civil aircraft fuels other than petrol, such as the new Aviator 24, 4 jet fuel, which is, in effect, a low grade petrol."

► **Refueling**, Nalac-Lang ground stops for the Comet are linked with pressure refueling that will push 8,500 lb. gal into the tanks in 20 min. Major portion of the fuel is carried in integral tanks, where Refuel and both elements refuel. Bishop says there has been an trouble with the integral tanks.

None that could get into the cabin area is for considerable time. Two rows of seats were shifted from back to front to avoid effects of pressure wave. Test firing showed that high pitch, no gas, regular sound came into the front cabin. Soundproofing didn't supply the answer and eventually it was determined that the noise was transmitted from engine to cabin through the structure. Rattle was caused by the engine being in the problem.

"Although the Comet was not by a lot quieter than conventional civil aircraft," says Bishop, "it has a less unpleasant sound, and there is almost complete absence of vibration."

► **Looking Ahead**—Through the Hotfield

1200° PLUS...

is a challenge!

Such extreme heat... generated by a modern jet engine... demands not alone positive action of self-heating parts, but

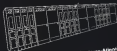


equally important... efficient cooling... using Roots blowers, with fan cooling and leading features in one structural unit, maintains this function up to the intense 1200°F temperature... ensuring vibration and structural breakdown caused by frequent and radical changes. >> Available in standard sizes, the new light weight Wilcox permits high reliability and simplified engine design.

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Shannon, Ireland—gateway for trans-Atlantic operations—demanded unfailing safety and dependability in communication equipment plus greater operating flexibility for this high traffic density station.

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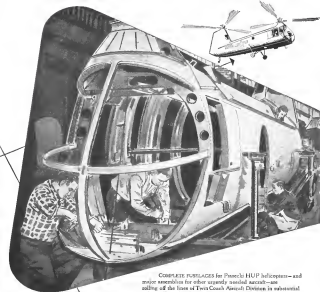
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A-100



See these, following companies, immediately and show this ad right in 1951 while still necessary. (Aircraft Technical Page 10) It is the best in the world today.



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Aircraft Division

BUFFALO, N. Y.

TWIN COACH PRODUCTS:

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lead built it a year ahead of the country in the jet transport field, the company isn't complacent, for it is locally aware of the competition. U S plane builders will outstrip it in the next few years. But Boeing puts it this way: "The Coast is an aircraft with relatively low wing loading has plenty of 'stretch' in its logical development of the type, and by making use of more powerful engines, we hope to be able to keep this lead ahead." The Coast 2 Coasts with the good four Rolls Royce Avons get 55,000 lb thrust is in the picture. This plane designed for greater stage lengths than the Coast 2 (powered by the 3,000 lb Avon Coasts), first flew last February. BOAC is slated to get the four-powered Coast in 1955.

And de Havilland probably is thinking beyond the Avon Coast, with its eye on the Supersonic and Olympus for more power and speed for transport not to cause

PRODUCTION BRIEFING

► **Aerodynamics Division, General Motors Corp., Dayton, Ohio,** has started manufacturing its new stream lining and dual ventilation equipment in propeller test buildings to aid research.

► **Aircraft Engineering & Maintenance Corp., Oakland, Calif.,** recently was awarded a two-day USAF contract to develop manufacturing cycle maintenance of USAF C-54s by civilian contractors, with the use of bringing procedures closer to those set up by military industry. Headed by Captain Air Force (retired) was Col. C. H. Dolan, maintenance director, West quarter, AMC.

► **Feed Instrument Co., division of The Sperry Corp., E. T. N. Y.,** has signed contracts totaling \$29.5 million during the first half of this year, twice as much as the same period in 1951.

► **Elmira Park Industries, Inc., Lincoln Park, Mich.,** has secured a controlling interest in Stanchion Engineering Co., Detroit. The firm designs and builds complete building programs for the mechanical industry.

► **Precision Gage, Inc.,** has opened a 12,000-sq ft addition to its plant in Edison, N. J., doubling former space.

► **Propeller Service Corp., Bradley Field, Conn.,** has received a one-year contract from the U. S. Coast Guard to overhaul all propellers for its planes. Some 600 propellers are covered in the agreement.

CANNON PLUG ACCESSORIES for the "AN" Series



Here is the answer to a frequent question we receive from people everywhere. Yes, Cannon does make a complete line of accessories to be used in conjunction with the AN Series of connectors. Complete engineering data on each of these is given in the Cannon AN Bulletin, available on request.

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Since 1915

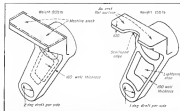


Factory in Los Angeles, Toronto, New Haven, Boston, Chicago. Sales offices in principal cities. Address requests to Cannon Electric Company, Dept. D-112, P. O. Box 71, Lincoln Heights, Boston, Los Angeles 10, California.

SKYDROL

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2008年12月15日 星期一 晴



They All Watch Scorpion Weight

Seven, eleven¹² may be lucky numbers when you're gambling. But in aircraft design and production they mean a mass of additional pounds you'll get in a completed airplane for every pound you add to the airframe. That's because each pound of weight requires additional power to maintain course.

To eliminate such a draft requirement on the FAA Scopes program at Northrop Aircraft, Inc. we cooling department was at extra provisions-type of final states.

Many of these suggestions are good. Others, while they may be of some weight, are not as practical. Here is a cost/total point. But whatever the decision as to the suggestion—negative or positive—as the plan made by Luther progresses, the suggestion is rebuffed in some or possible of the store's status. This may seem like a lot of negative detail, but Vanthrop finds it to be, in an important fashion, an encouraging further suggestion.

► **Sagittarius Brand-Bornth**, identical sagittarius, has included dimensions of tubes (compression, elong., or radial), approx. diameter, form construction, elements or construction.



METAL CLOSURES

Yes, Precision Metal Circles by Tubing Seal Corp. were the **FIRST** on the market and remain the **FIRST** in the market.

For ten years, the Armed Services major aircraft companies and their suppliers have periodically specified Teflon Seal Cap Metal Protection for lines and fittings.

• Seal Out Dust and Moisture • Seal Its Field • Resist
Rust, Grease • Can't Chip • Keep Hydraulic Systems
Clean • Spin On By Hand For Fastener, Sizing,
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 Gabriel, California
 Eastern Office: 428 New Center Rd., Summit, N. Carolina

- products, etc. Some of the latest suggestions call for:
- **Titanium is place of steel.**
 - **Heat treatments in place of standard annealing, to take advantage of higher alloy steels.**
 - **Steel castings with wall thicknesses of 0.1 in. or less where strength permits.**
 - **Changing supply sources when a lighter part can be obtained.**
 - **Forging alloy in place of heat for balance weights in control systems.**
 - **Calling for specific vendors on drawings in order to obtain the lightest purchased part.**
 - **Review of necessity for joints or splines.**

• **Target Weight—Northrop** compensates its suggestion system with another desire to promote interest in weight saving. This is a special notebook, "Target Weight"—compiled monthly by engineers, and it's been found effective in the battle.

Because part experience in the industry has shown that airplanes increase in weight from the time the prototype flies until the production version is ready for flight, Northrop's weight engineers have set up a "target weight" value. This is 4% under specification weight and extensive consultation with customer design is urged to hit the target.

Target Weight tells the constant

weight of the plane, the target weight and the change since the last report. Compiled jointly by Production Engineering and the Weight Section, it includes information on aircraft loading, controls, electrical, equipment, hydraulics, landing gear, powerplants and wings.

In addition to the newsletter, a detailed breakdown of target weights is compared to current weight. It itemizes each design section for the engineers for which it is responsible. Reviewing that comparison, design supervisors can determine which items overbook the target, and then check the possibilities of changing the design to meet the goal.

• **Small Screw Specifications—But** one target weight isn't a final aim. It can steadily seeking minimum weight. But weight can often end up below target. Even so, one of the most important reminders that 1 lb. added to the airplane can bring a 7 to 10 lb. increase in the non-plated plane, the question is often raised whether small weights—0.1 or 0.2 lb.—are worth consideration. Northrop thinks they are. For it is in the large number of small weight reductions, plus only a few if any, large reductions that ultimately result in "maximum weight saved."

One way to reach a conclusion is to determine the percentage of change. Because target weight is, on the average, only 4% under specification weight, a reduction that approaches or exceeds that value is considered worthwhile in profiles of how much for actual savings.

Example: Two capacitors, functionally identical, weighed 0.007 and 0.003 lb., respectively. Weight difference was only 0.004 lb., but because its weight of the heavier unit amounted to 35%—considerably higher than the 4% saved for. So, the change was worthwhile.

• **Special Operations—Northrop** feels weight reduction on detail parts is a very important factor. Milling, turning, drilling, sheet metal drawing and stamping operations in the F-10 program all offer worthwhile savings. It's been found that the extra cost of milling is justified in most instances.

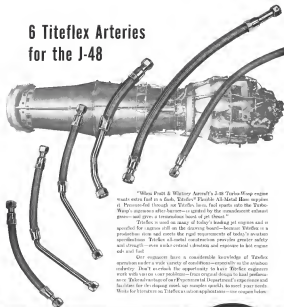
• **An extra ounce of drilling operations** which increases 0.4 in. in aluminum or 0.2 in. in steel is considered justified from a cost per weight saved point.

• **In turning jobs, an additional operation** which removes 0.1 in. in aluminum or 0.05 in. in steel is justified when the operation is to be done under the same setup as assembly operations. If a separate operational setup is required, a saving of 0.4 in. of aluminum or 0.2 in. of steel is not necessary to justify it.

• **It is deemed economical to drill holes** 1/8 in. or larger, to remove 0.24 in. in steel material.

• **In sheet metal operations, it is con-**

6 Titeflex Arteries for the J-48



"When Pratt & Whitney Aircraft's J-48 Turbo-Prop engine wants extra fuel in a dash, Titeflex® Flexible All-Metal Hoses supply it. Pressure-fed through six Titeflex lines, fuel spurts into the Turbo-Prop's engine after burners—in control by the unobstructed exhaust gases—and gives a tremendous burst of jet thrust."

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Our engineers have a considerable knowledge of Titeflex operations under a wide variety of conditions—especially in the aviation industry. Don't overlook the opportunity to have Titeflex engineers work with you on your problems—from original design to final performance. Take advantage of our Experimental Department's experience and facilities for the design, build, up samples quickly to meet your needs. Write for literature on Titeflex aviation applications—our engineers follow.

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added weight for weight reduction to include additional clamping to eliminate 0.005 in. of clearance or special clamping operations which eliminate 0.001 in. of clearance.

• In testing operations, all corners of sheet metal parts which do not have to be exposed are rounded. Northrop feels that on its sheet parts it can incorporate wing-like edges or holes to save weight without appreciable increase in cost.

• Department Tenetwerk-Process Engineering at Northrop is proving particularly helpful in helping weight engineers adjust or accept realistic material substitutions which will assist in weight savings.

Weight engineers are continually working with the process groups to extend the use of aluminum alloy both in and out of many applications where strength permits. Also being studied is the application of ribs and bolts made of aluminum for additional weight reduction.

Feasibility Engineering considers the effects of the weight and design stresses from a cost viewpoint, using the aluminum dollar value as a basis to provide a meaningful solution to present an efficient weight-saving control.

• Vendor Participation—Vendors, too, are enlisted in the program.

Utica's a typical example of vendor participation. For one model of the F-89, Northrop chose a group of 12 parts from existing drawings still in the bench, and provided a set of them as a number of alternatives. Items were asked to meet the probe for the lightest existing configuration possible in these particular pieces, with reference to maximum draft angle, web and wall thickness.

When the leader needed parts to cast in, Northrop engineers computed the weights of the standard-part castings and conventional castings. For the 12 roughings chosen, the average weight saving amounted to about 6.25 lb per casting. With this comparison from the vendor, Northrop was able to get a total weight saving of approximately 175 lb per casting.

West Coast Firms List Titanium Needs

West Coast materials engineers are recognizing the day when titanium—the legendary metal for aircraft and engines—will be studied as a material. Right now, the metal is expensive and not plentiful, so manufacturers can't breathe. But when supplies increase and cost drops, growing titanium will be a reserve plane of material supply.

Trying to keep ahead of the situation, the Metals Stockholders Association



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The extra measure of toughness forged into jet engine blades by Utica's methods is a vital factor in the reliability of the engine and safety of the aircraft.

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Turbine assembly of F4U's Turbo-Wasp after 500 hours of initial operation. The Turbo-Wasp is one of the great engines for which Utica supplies blades.

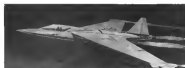
pleted facilities by which the forged blades are finished to the most rigid specifications, ready for use.

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TODAY'S ANSWER to tomorrow's zero problem: Artist's vision of one highspeed, high-temperature supersonic Mach 3.5 aircraft scheme incorporating glass-plastic laminated makeup with rivets.

Glass-Plastic Plane for Future?

Need seen for new aircraft structural materials, as high heat at high speeds weakens today's metals.

Los Angeles—Test pilots flying the latest experimental aircraft out of USAF's Edwards base in California now speak of the supersonic zero burner in the same way a Sunday driver might talk about a bump on the road.

Bill Riedemann, who has taken the Douglas D-558-II Skyrocket to altitudes and speeds no other plane has ever reached (Aerospace News July 16, 1951, p. 14), says the accelerated rocket craft went through the zero wall with the ease of a tiger going through a paper hoop.

Heat attacks—like these planes, as well as the materials and designers who build the planes—day by day, have long known that a more formidable barrier lies in the high speeds ahead of them—the heat barrier.

A pilot flying the Skyrocket had the deconstructed graphically not long ago when the retrojection equipment on the D-558-II failed while he was on an evasive maneuver from the heat. He became a truly "hot pilot," almost popping out from the heat before he could get the supersonic craft on the ground.

And this high heat condition can do strange things to metals now conventionally discarded. Aluminum and magnesium alloys can lose their strength. Wings and skin sections can warp and twist out of shape.

The heat results from the friction of air against skin surfaces as the aircraft flies through the atmosphere at supersonic speeds. And as the kinetic energy is transformed into heat energy, the resulting temperature rise is directly proportional to the square of the velocity. Thus, as the speed of a plane doubles, the heat temperature rises fourfold.

At the over 1,100 mph, which the Skyrocket has reached, the air can maintain temperatures as high as 2000° F. This creates walls to slightly more

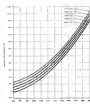
than 1,000° F at 2,600 mph. German scientists found that surface temperatures on the V-3 rocket exceeded 1,700° F.

At 500° F the strength of the best heat-resistant aluminum alloy (248-T) drops 70% after continued exposure. For 718-T titanium alloy, the loss is 50%.

Answer for Tomorrow—Unlike the zero burner, the heat barrier is not a wall which the accelerated aircraft cannot break through. There is no "other side." The faster a plane flies, the hotter it gets as long as it remains in the earth's atmosphere.

What then can be done to lick the problem? There is a hint in colloquialisms. An aviator must be "cool" from the heat of the engine as he is on the downing islands of today. What will it be like?

One startling answer has come from Thomas E. Piper, director of materials and process engineering for Northrop



SURFACE TEMPERATURE vs. altitude (USAF summer day).

Aircraft line. The airplane of tomorrow may be a glass airplane, he says.

Piper's design plane, shown in the accompanying artist's sketch, has glass wings, glass aluminum, glass stabilizers and an all-glass fuselage. The structure is welded from plastic materials. It is held together with glass rivets. Its engine, using a new fuel and lubricated with a dry heat-resistant metal powder, can handle a thrust of 10,000 lb or more than 2,000 mph.

"This aircraft is not just an artist's fantasy," says Piper. "It must be built if explorers are to fly successfully at top or close to the speed of sound." • National—The glass plane laminates the structure of the future aircraft offers many favorable characteristics at high speeds:

- The strength/weight ratio of the resulting material is favorable and a high percentage of strength is maintained at temperatures around 500° F.

- Phenolic-resin-impregnated, glass fabric laminates, having a tensile strength of 61,000 psi at room temperature, experience little or no loss in mechanical properties at 500° and would lose a strength of 35,000 psi after an exposure of 100 hr at 500°," says Piper.

- The heat-treated material has a lower coefficient of expansion than a metal structure. Thus, changes produced in different parts of the aircraft by varying exposure to heat will be less severe than in metal aircraft. This will tend to decrease the stresses which cause metal structural problems.

- This is due not only to the low heat-transfer properties of the material but also to the fact that it is integrated with the materials possessing uniform coefficients of expansion instead of dissimilar metals having different coefficients," Piper points out.

- The material also is more flexible than metal.

- Simplified tooling will reduce production costs by a large amount, since Piper believes it is possible that an entire aircraft could be formed from plates in four or five large molds, with only a handful of skilled workers needed.

- Increased aerodynamic smoothness would be achieved through elimination of many rivets, screws and flap joints. Each molded surface produced would have the same contour as each preceding part, says the Northrop Aircraft co. expert.

- Fuel—New fuels will be needed to power this wing-borne fighter in its streaks through the atmosphere at Mach 3 speeds.

A fuel must be found with such a low vapor pressure that it will not boil at the pressures and temperatures produced in the fuel system. Refig-



Here's the new:
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You can produce positive photographic intermediates directly from your engineering drawings by

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1. Kodagraph Autopositive Paper Extra Thin—the all-purpose intermediate material for everyday use—gives you intermediates on a durable, white paper base. Intermediates which will turn out crisp, clean blueprints and direct-process prints one after another... which will retain their fine density and sharpness... and which will remain photo-lasting in the files.

2. Kodagraph Autopositive Paper Translucent... has an exceptionally durable and translucent paper base... and a print-back speed which is 50% faster than regular Autopositive—as important advantage in large-volume print production.

3. Kodagraph Autopositive Film—with its highly translucent Kodak safety film base—is especially valuable in reclaiming "hopelessly poor" blueprints... and in reproducing extremely fine line detail. It is also widely used to reproduce catalog pages, etc., including half-tone illustrations.

4. Kodagraph Autopositive Cloth—is recommended for producing the most durable prints (nearly exact in scale) from drawings in good condition. Its base is white fabric—tough, crease-resistant, highly translucent.

Kodagraph Repro-Negative Paper, which is processed in the same manner as the Autopositive Materials and with the same speed and convenience, enables you to produce positive intermediates directly from blueprints, Van Dykes, and other negative "originals."



If you have any type of contact photostatic machine, you can get negative and positive reproductions of improved quality at lower cost with Kodagraph Contact Paper. Its high-contrast photographic emulsion produces photostats which are easier to read—with dense photographic blacks, clean whites. And its extremely wide latitude and amazing uniformity cut the need for split-second timing and trial-and-error testing.

Kodagraph Contact Cloth, with an extremely durable, translucent base and with similar emulsion characteristics, is widely used to produce long-lasting, needed originals from paper negatives. (Unwanted design detail on these negatives can be blocked out before printing.)



If you have an enlarger, projection printer, or process camera, Kodagraph Projection Paper will give you sharp, clear reproductions at any scale—dense photographic blacks, sparkling whites on a durable, Kodak-made paper base. Just the papers you need for reproducing your own film and other reduced-scale negatives.

Kodagraph Projection Paper can be printed at high speeds and processed under comparatively bright workroom light. Kodagraph Post Projection Paper can be printed at highest speeds but must be processed under low illumination. Kodagraph Projection Cloth is the ideal material for producing extremely durable and frost-proofing positive intermediates from reduced-scale negatives.

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condition of the fuel tanks has been improved to take care of temperature conditions.

► **Exhausts**—Since wet lubricity developed for temperature ranges from 350 to 700°F probably will be a universal factor over the past extremes of test practice at which the lighter will operate, new lubricants must be found. These future high-temperature lubes, Piper believes, probably will be of the metallic dry powder or dry film type such as molybdenum disulfide, with or without a carrier.

► **Elects**—These glass fasteners will have endosteal fibers impregnated with aluminum or phenolic resins. High temperatures will produce no diffusion of expansion between the metal and the material being joined, the Northrop engineers explain.

► **Other Glass Reinforced**—Several problems presented by the heat barrier are solved by the resins. Lighter of the future. The canopy will be a plastic glass instead of the present methacrylate plastic. All sealing applications will use new heat-resistant rubberlike materials.

Surfaces will be finished by a new technique—"finishing" aircraft of the future must maintain a more perfect surface than the finest hole ground piece made today," Piper points out.

► **Wash**—The Northrop engineers believe this futuristic clean airplane of the future is much closer than many people realize.

"The hinged cockpit piece of the next future must be built of something other than conventional lightweight alloys," Piper insists. "A complete military combat-type airplane designed specifically for glass plastic materials and manufacturing methods is coming and actually within the realm of possibility."

A set of glass plastic wings already has been built by British defense manufacturers. These wings will be flight tested in about six months. American firms also are considering extensive structural use of glass plastic materials, he said.

Northrop has been doing experimental work on the glass plastic. Piper admits, though, no results have been conclusive.

And the Northrop executive, apparently realizing that people who discuss "glass plastics" shouldn't know about them, also admits that developments in titanium, lightweight steel, and new composites and aluminum alloys may find a place in the air force of the future.

For a while at least, B.E. Baldwin and the other aerospace test pilots at Edwards still must sweat out the heat barrier in present old-fashioned metal airplanes.

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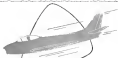
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British Study Pod-Copter Service

Helicopter and detachable landing (pod) arrangements shown above are passenger and cargo-hauling scheme planned by Silver City Airways Ltd., British carrier, for cross-Channel traffic. The copter proper, in future service, would be upper portion (black) of the configuration, with the pod compartment (white) below to accommodate 13 passengers in the nine and two seats; motorcycles and bicycles in the freight area below. The general configuration planned is similar to the Puffin Plane built for USAF as the XC-120 by Fairchild Engine and Airplane Corp. (Aviation Week

Nov. 11, 1959, p. 21). Operation envisages passengers and cargo being put aboard a waiting pod while a copter with pod attached hovers over the Channel at the 10 gun top from the opposite terminal. Touching down, the copter's pilot throws the switch that releases the attached pod. The copter then rises, settles over the waiting pod and hooks on to it for another flight; the quick turnaround necessitating no almost continuous operation. Silver City has already issued a specification for the rotating configuration to a number of British contractors.

generations will appear in a second big issue of Aviation Week.

"Rocket Upper Air Research" by Homer C. Newell, Jr., Naval Research Laboratory. Following the two billion experiments of Toulouse, de Brest in the closing years of the last century, the atmosphere above the region in which the normal weather patterns occur was at first believed to be of a constant low temperature. In the ensuing decades, however, advances from sound propagation experiments, various observations, and complex and dry light studies led to the discovery that atmospheric temperatures varied widely with altitude. During the course of these many investigations, the picture of the atmosphere changed to a rather complex picture showing a quasi-atmosphere of about 20 kilometers height, a warm exosphere from 15 to 30 kilometers altitude, an extremely cold region in the neighborhood of 80 kilometers, ionospheric layers centered at 60, 100, 200, and 400 kilometers roughly, and changing degree temperatures at great heights.

Before the advent of the rocket, however, progress in rocket science—with the advent of space travel—highlighted the full meaning of the American Rocket Society at Chicago, Nov. 9 and 10. Of new technical papers presented at the three sessions of the meeting, five dealt directly with flight in outer space, and two considered the implications of research at the lower strata of space. American Wire presents, in the following paragraphs, the authors' summaries of most of the papers prepared for the ARS meeting. The remaining

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only the lowest 50 kilometers of the piston could be riveted by direct impact, but being the greatest height to which instruments could be carried by balloons. But with the engaging triumph of the V-2, Waco Corp., Arlington, and Viking rockets, it has been possible in the years since 1945 to extend direct measurements to as high as 700 kilometers. The rocket, in partnership with modern gadget of engineering skill, the radio telescope, has enabled the geophysicist to answer a number of important questions.

Rocket experiments have shown that the 712K and higher atmosphere temperatures are in the neighborhood of 50 kilometers obtained by indirect estimates, although quite widely in agreement with the facts, are too high by at least 60K. Data between 50 and 200 kilometers obtained from rocket observations have been verified by direct measurement, and from 50 to 70 kilometers, a factor of 2 difference between upper and denser near-Machopsonic and lower near-Machopsonic.

The heights of atmosphere layers appear from indirect measurements to be appreciably lower than ground-based measurements had indicated. The air density on the order of 10^{-10} grams per cubic centimeter at 270 kilometers is far lower than previously, requiring considerable adjustment in thinking about the density of the atmosphere layer. In doing about the light-absorbing region in the atmosphere, it has been possible to observe solar radiation in various before unobscured regions from the rest of the world, and the very portion of the spectrum. Such solar radiation studies are among the most interesting for the upper atmosphere, and it is to expect these and atmospheric and ground observations that the rocket experiments lead to the answer for bigger and better rockets.

► "The High Altitude Sounding Rocket," by Milton G. Rosen and Richard S. Sood, from Naval Research Laboratory.

For many centuries man's original and modest ascent seemed almost limited by the heights of mountains and the altitude attainable by an unpowered vehicle. But in the last few years, sounding rockets have emerged almost suddenly as a means of ascent, and they had led to produce a number of new vehicles in the past decade.

With the exception of the German V-2, high-altitude sounding rockets are no longer an American design. The Waco Corp., Arlington and Viking have manufactured from one of several components in altitude between 40 and 140 miles. Twenty sets of instruments were carried to similar heights by V-2s during the course of a six-year program which is now continuing. New techniques for observing the flight performance of these rockets and for recovering instruments from the instruments they carry are in common use.

The sounding rocket is the immediate predecessor of the space vehicle—it is a significant step toward extra-atmospheric exploration.

► "Exposure Manual from Cosmic Radiation at Extreme Altitudes and in Free Space," by Dr. Herman J. Schmitt, U. S. Naval School of Aviation Medicine.

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Announced simultaneously was a new order for Super Constellations placed by Lanza Aeropostal Venezolana, L.A.V. also made their selection their careful consideration of the finest competitive equipment. This choice is backed by their long previous experience with the dependable Constellation.

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Flow patterns from supersonic to hypersonic speed are seen by the reflecting eyes of the slender specimen in NASA's 16x14-in. supersonic wind tunnel at Ames Research and Laboratory, Moffett Field, Calif. Model made at Langley of German V-2 gun, etc.

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the purchase order for the four Super Conductions. Cash requirements to meet these obligations will total \$2,500,000 for 1952.

Increasing Utilization—The company has demonstrated a steadily rising utilization of its working funds. At the 31, 1951 it showed an excess of current liabilities over current assets of \$129,158. By June 30, 1952, the negative working capital position was reversed to show an excess of current assets over current liabilities of \$142,184. The company reported that it had no part of the security payable and has filled its working capital requirements under its bank loan agreement. Moreover, further funds were available to it under the credit arrangement.

Underlying Seaboard & Western's financial development, are the substantial gains in its scope of operations. Available records show that for the year ended Aug. 31, 1948, a total of 1,531,094 piece orders and 4,857,087 freight ton orders were flown. This had increased to 5,217,591 piece orders and 3,165,379 freight ton orders for the year ended Dec. 31, 1951.

Revenues and earnings have matched this growth. For the year ended Aug. 31, 1948, total gross revenues aggregated \$2,805,931. The company is a striking when compared with the \$10,784,942 shown for the year ended Dec. 31, 1951. Net income has followed this same course. From a net profit after taxes of \$113,772 for the year ended Aug. 31, 1948, a total of \$518,065 was reported for the 1951 calendar year. This latter period excluded a net capital gain of \$184,903 from the sale of assets.

For the six months ended June 30, 1952, Seaboard & Western total revenues aggregated \$5,940,660 and after operating expenses amounted to a net before taxes of \$667,094. After taxes net income amounted to \$272,577. The latter period included a \$410,760 net capital gain from security sales.

Certificate—Brieley-Superiority, of the company's 1950 bond ratings, about 75% came from the Pacific coast. For the five months ended May 31, 1952, this ratio was around 68%. This is a considerable of the company's interest in developing markets. Its basic activities, of course, is centered in international air cargo operations in the North Atlantic field. The company declares any plans for expanding its activities to domestic and overseas air freight.

Seaboard & Western has been operating under a CAB letter of authorization as a large regular carrier. Its dependence on account of the governing regulator grows more highly indicating the extraordinary and frequently better representation surrounding these proceedings.

Seaboard & Western's last applica-

tion was filed July 17, 1946, for a certificate of public convenience and necessity for the transportation of property only between the U. S. and areas in Europe and the Near East.

In a modified last summer, the company reports. By decision of the Board rendered Feb. 3, 1951, approved by the President. May 10, 1952, and application was denied in all respects.

By order dated June 24, 1952 and approved by the President. June 26, 1952, the Board found that there may have been significant developments in respect of trans-Atlantic cargo service since the regulatory hearing in this proceeding, evidence of which could be

presented in a request of proceeding and that it established by the applicants the public convenience and necessity might be found now to require the revocation of use or both of the applicants, with a corresponding modification of the Board's decision herein. Accordingly, the Board proposed the said certificate proceeding for rehearing and reconsideration and the same is now pending and undetermined before it.

This simple aerial does not begin to reflect the drama and tension that has gone before and which is likely to follow before this last case is resolved.

—Sickel Attached

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'Little Black Boxes' Move In on Pilots

- Western Electronic Show bears about avionics advances in telemetering devices, transducers, computers.
- But shortages of engineers may slow future progress, meeting hears; Canadian money lures some.

By William J. Goughlin

Long Beach, Calif.—The emphasis on telemetering, transducers, and electronic computers, as more than 10,000 engineers, physicists, and technicians flocked out for the recent three-day Western Electronic Show here.

The large attendance seemed to augur portents for a California industry that the avionics industry is growing twice as fast as the West as it is in the rest of the nation.

The majority of 300 exhibits and most of the papers presented during the 20 consecutive sessions involved products or subjects either directly or indirectly connected with aviation, TV and radio equipment took a back seat with ease of the visitors coming from nearby aerospace or electronic manufacturing areas.

The convention was jointly sponsored by the Institute of Radio Engineers and the West Coast Electronic Materials Trade Assn.

► **A Pilot's Reception:** To a pilot walking through the exhibit hall and attending the IRE seminars, a no-longer-see but become increasingly clear. The dis-

was fast approaching when he would become even bigger. The "little black boxes" were closing in on him.

Exhibits such as that of Hoffman Radio Company's new lightweight "Gibson Gel" electronic transmitter were attracting attention that the pilot was not yet realizing. Just one look at the electronic computer on display was enough to set him shivering in his flight boots.

► **Shortage of Engineers:** It goes as no surprise that the shortage of engineers is getting worse not better. R. L. Stull, IRE regional director and chief electronic engineer of Consolidated Engng Corp. summed it up this way: "There isn't a single, as purchasing need for well-trained, brilliant young engineers who will turn the load of the growing industry. There appears to be an over increase shortage of such men which may eventually result in a drastic short use of both needed weapons for defense."

The second-day California Chapter of the Institute of Radio Engineers met in the afternoon in the West to the fact that some confusion in engineering in this direction is under

to take advantage of the attack on time.

But one trend which surprised some engineers at the Long Beach convention appeared to parallel a similar development in the aviation industry. Several government agencies were missing, head south of the U.S. border by high skilled needs of the Navy to rapidly expanding Canadian aviation industry. It took no electronic computer to figure out that great power can outlast willow, machine almost everywhere.

► **Award to Pettit:** The IRE Electronic Achievement Award for the Pacific region was presented to Dr. Joseph M. Pettit of the Stanford Research Institute. The award was made to Pettit who was president in radar center research during the war, for his contributions to electronic research and innovation.

► **Spotlight on Telemetry:** The growing importance and use of telemetering systems to transmit data from remote and guided missiles was evidenced by many technical papers delivered in the subject. To cite an example:

► **Monitoring flight tests of new experimental aircraft is possible with a new Douglas Aircraft Co. telemetering system.** Floyd E. Evans, of Douglas described the system which permits Douglas engineers on the ground to observe a test pilot at once how various maneuvers he is conducting are affecting the airplane. The system also includes

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automatic data reduction processes
when data flight test data automatically
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• **NAVIGATIONAL CAPABILITY**—Increasing
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to engine areas via a dedicated VHF, A
type of Broad Area Navigation. This system
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at any given time and is activated
by increasing tracking rate on the
ground. After temporary storage and
analysis by laboratory groups, the in-
formation is passed to base significant
desired data in an automatic electronic
typewriter at the rate of 15 characters
per second.

• **Signal recording systems** for the
maneuver data system uses a pulse-width
modulated system to modulate a 500
kc. carrier at the receiving station was
described by D. J. Sweeney of the
Naval Ordnance Test Station at Lake-
mead. The number of data words in each
pulse of the 500 kc. carrier is then
counted electronically, and these counts
are recorded by means of seven glow
tubes in a recording film camera.

• **An FM/FM teletransmission system**
compatible with standards established
by the Research and Development
Board was described by R. E. Colander
of Radio Associates-Pacific division.
He said how the increased maximum
data transmission capacity could be en-
forced under certain conditions with-
out exceeding data transmission ac-
curacy.

• **Electromagnetic Transducers**—The latest
design which convert desired intelli-
gence into electronic signals for use in
identifying the cause under discussion
at the meeting.

• **Weathering tests**—transducers, relatively
new to the electronics field, were de-
scribed by Robert W. Fendler of the
Rivers Jackson Co. The device can be
used to measure any quantity which can
be converted into a small linear dis-
placement and applied to the end of a
"flexing arm." The system includes the
pick-up containing a small stressed wire
flexing at its natural frequency and a
superior feedback amplifier.

Changes in the variable under measure-
ment cause a change in the fre-
quency of the amplifier's output.
Frequency and the transducer system
output frequency, and hence its am-
plitude, is amplified by changes in the
amplifier characteristics and that the
system has high frequency response and
low hysteresis.

• **Rate gyro characteristics** studied to
measure angular rates of rotation in
flight, yet capable of withstanding ex-
treme shock and temperatures were
described by Henry M. Sturte, Jr., of In-
strument Associates of California. He
noted the advantages of using float
type rate gyros, with bonded rate

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springy, stress damping, and a high natural frequency.

• **Insulation size** can be reduced and output voltage can be increased using a new development in unhealed thin gap technique, Bernard B. Hilliard of Southern Lake said his audience. He showed them a present transformer only 1 in. in diameter, and an accelerometer pickup with an output of more than one volt.

• **Transistor-Vacuum tube** faced to the transistor vacuum bench speaker describe.

• **Most efficient** junction-type germanium rectifiers and diodes, principally of the p-n-p type, designed by General Electric, John S. Soley and Fred C. Lee devised a method for artificially creating p-n junctions by diffusion of donor and acceptor type impurities into a single crystal semiconductor. The result is a high gain, low noise, semi-conductor with good stability at high power levels, Soley said. The new devices can be enclosed in a plastic bead of less than 1/8 in. diameter.

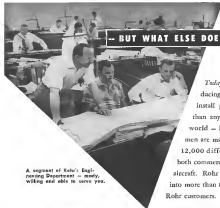
• **Photoconductor** transfer of the p-n junction type which has a sensitivity of 50 cps per lumen for light of 7,400 deg. K. color temperature. J. N. Stone of Bell Telephone Labs described the new photoconductor which he said has a frequency response flat into the 100 mc. region and which is encased in a plastic housing 1/2 x 1/2 x 1/2 in.

• **Transistor** pulse circuits in which pulse rise times of 0.1 microsecond are easily obtainable with a supply voltage of 10 to 45 volts. A. E. Anderson, who of Bell Labs, said that pulse rise times of 0.01 microsecond have been obtained at 5 volts. In these circuits, output impedance is less than 50 ohms, and the circuits are very insensitive to stray wiring capacitance, according to Anderson.

• **Converters** and **Computers**—Devices to convert analog type data into digital form for use in digital computers were in the more discussion than the computers themselves. Some of the devices described were:

• **SARAC**, a device for converting low level analog voltages from strain gauges or thermocouples into equivalent three decimal digit data. The paper by R. L. Sink and G. M. Stoenberg of Consolidated Eng'g Corp. described the use of self-balancing potentiometers with 1,000 discrete balance positions which provide an output in the form of contacts suitable for operating teletyping equipment, tape, punch cards, or for direct connection to a digital computer. Accuracy and stability was reported to be within 0.1%.

• **Speed-pulse** converter in which the number of pulses in a digital representation of the displacement of the analog data signal shall focus away. The converter was described by G. W. Land of



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One is the more compact and simplicity of a compact control that space—the more than halves of installation, assembly and inspection time. Other examples of Hartman Universal Controls are shown below.

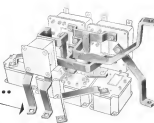
Typical of the smooth efficiency that comes from half a century of specialization in controls, Hartman engineers are ready to whip your problems, no job too small with Hartman now is when Universal Controls can do for you. You'll never miss the bus you're now installing—and you'll save space, weight, and precious man hours.



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"DC" CONTROL HEADQUARTERS

MANSFIELD, OHIO



Engineering Research Assoc. Inc. • Highspeed relays: to expand the output of a digital computer. The device, as described by W. H. Wenz of Read Corp. uses a moving shaft and voltage sensitive triac-like paper to permit up to 80,000 bits per minute in binary code.

• **Mississippi**—Some of the other papers of interest are listed below.

• **Increased tube life**: By reducing vacuum tube filament voltage from 6.3 to 3 volts, a designer can increase tube life by 50%. Lengthen tube life, cut filament power supply requirements, increase tube filament life, and cut the cost of tube. Arthur J. Winters of Tele Computing Corp. told his audience. He presented analytical and experimental data to show the effects of reduced filament voltage on various tube characteristics.

• **More efficient power supply**: The use of vacuum tubes to reduce the output impedance of power supplies which use magnetic amplifier regulators will improve the unit's efficiency. John E. Richardson of Hughes Aircraft and Some power supply efficiency can be as low as 90%, he said. Richardson described the technique which he used to avoid double efficiency at no increase in size and with about 10% more power.

• **Diagnose detector**: A new, non-invasive technique, called "Hemodynamic function" in which the amplitude modulation of the carrier is changed by shifting the phase of the carrier rather than that of the sidebands, was described by Frank E. Vornet of Hughes Aircraft Co. Use of this technique, he said, permits measurement of phase to as low as 0.001 in 1/4 degree or better.

• **Automatic crane control**: The need for automatic crane control to improve load accuracy and thereby increase the range of load capacity was noted by J. A. Shull of the J. B. Rice Co. He then described a computer which could do the needed job.

• **Refrigeration for missions**: The use of germanium diodes and transistors might reverse the recent trend toward use of high temperature vacuum components and air cooling, D. T. Drake of North American Aviation pointed out. With new materials, particularly germanium, in ambient temperatures under 70K, then use in vacuum equipment could raise force designers to use refrigeration. Drake suggested mounting vacuum components in a plate through which the refrigerant or coolant would be passed.

• **Phase shift zero current**: A zero current which can phase shifting operation instead of voltage or potential, but in forward conduction positive duty and in which the zero current is obtained by comparing the phase rather than the magnitude of the capacitor voltage.

SPECIFY



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EQUIPMENT



THIS GANFLEUR (shown exploded, center) modified auxiliary piston engine in 40 sec after preflight had been kept at -68F for more than 24 hr in cold test.

Altitude Boost Claimed for Device

Higher jet combustion efficiencies are possible when Ganfleur changes vaporized fuel to superheated gas.

By Scott H. Ritzinger

The propulsion that a device called a Ganfleur can add 16,000 ft. to the fighting altitude of one military aircraft has been made to MANIERS Wren by Robert Ruchelshaus, Co., Stamford, Conn.

The unit can do this, the company claims, by mixing combustion efficiency to a point much higher than heretofore obtainable in jet engines, generating better mixing and more stable fuel at high altitudes.

Robert Ruchelshaus, president, states the system is proven and can be quickly installed in any military jet engine without requiring major design modifications.

► **Proven Feasible.** Field reports as long as oil lines intervened by AVIATION Wren and astronautical engineers as Ruchelshaus' claims are feasible. "This is an 'Army-gone-blink' type development," the executive says, but a product is in the making for the past 15 years, with several test products which already have reached the market including a new, highly efficient burner for industrial furnaces.

This reporter studied a 1947 report by a government agency that showed

an early model of the Ganfleur cut fuel consumption in a J45 jet engine combustor from 74 to 56%. Important fuel savings also are claimed by Ruchelshaus.

► **Gaseous Fuel.** The Ganfleur gets its craft a big lift by introducing a gasifier, rather than vaporized, fuel into the engine, the first explosion. Before fuel reaches the main combustion area for mixing with air and ignition, it is given a "preheating mix" with fuel as it goes through a spout of flame located by a burner in a small part of its own fuel in a special spout to hang it from the fueling vapor stage, to a superheated fuel gas, the company claims.

► **Low Pressure Delivery.** The system is described as a low pressure, type-10, liquid fuel, and more complicated high pressure fuel delivery systems commonly used. Some of these operate at pressures up to 1,000 psi.

Ruchelshaus thinks he may have a hand now to face in getting acceptance of his system because of heavy investments already made in engineering and production of present systems—but he believes it is something like it must be designed if altitude performance is to be improved measurably in jets at the present time.

The alternative, as he sees it, is a recent study of higher and higher delivery pressures necessitating more complex equipment to obtain fuel and more vaporization of the fuel with not much increase in performance. He stressed, he stresses that his system is relatively low cost, weighs only a few pounds, and involves only a few parts.

A low pressure system is in use, as the British Sopwith jet engine produced by Wright Aeronautical Co., but that is not similar to the Ganfleur.

► **Army Station.** The Army is procuring a small piston-engine version of the Ganfleur for Arctic starting of auto engines, Ruchelshaus says. In a past release with the company, Army states it seems to be an answer to the Army's power for something to combat cold weather. "The unit was tested at Ft. Belvoir, Va."

Army says it starts engines "no less than 70 sec. in temperature as low as -60F." And this is without any external preheating. Ability to turn engines for starting depends on methods of starting, oil system and lubricants, studies of which "... have long been underway," it declares.

Another Ganfleur model started a high powered aircraft engine in 40 sec, though the engine had been kept on ice at -55F in simulated Arctic conditions for more than a day, Ruchelshaus relates. It would take up to an hour to start by conventional means, he claims.

The system used for aircraft piston engines has a special blower to supply air to the fuel in the Ganfleur. The Army, not depending on vacuum in the intake manifold, says, has the jet engine system which Ruchelshaus is not it wants to show.

► **Meritor Operations.** Fuel is fed to the main line to the carburetor, mixed to the Ganfleur, which mixes it with air and ignites it. The system takes the place of the jet engine, too, and the engine as long as required for several combustion to take over. It is actuated by a pressure switch which sends air to a pressure switch and to operate a springing in the Ganfleur and a solenoid valve to allow passage of fuel to the main line.

Only a small portion of the fuel is burned in the combustion zone of the Ganfleur. The major part passes through the flame over the fuel plates and is discharged in a superheated gas into the induction section of the engine, it is added before the carburetor mixing part. Discharge in overhauling fire in turbine lines is avoided since the fuel gas is considerably preheated by mixing with hot fuel-air mixture coming from the carburetor throat in the normal manner.

The Ganfleur system is designed to be simple in appearance—the operation de-

CLARE RELAYS "Custom-Built" for AIRBORNE EQUIPMENT



Persons on this page are just a few of the hundreds of relays "custom-built" by CLARE for military and civil aircraft use. They illustrate the adaptability to the diversified needs of the aircraft industry and the military services of basic relay designs and high standards of engineering and inspection which have made CLARE Relays "first in the industrial field."

Four of the five relays shown are variations of the same basic relay structure—the CLARE Type "F"—which is characterized by unusual sensitivity and extremely long life. It is an ideal combination of the very real advantages of a telephone-type relay with the small size, light weight and high resistance to vibration needed to meet the rigid requirements of aircraft service. It is but one of a number of basic relay types available to aircraft designers.

Of an entirely different type is the Inverter Failure-Indicating Relay (shown at the bottom). This is one of a number of CLARE Type "500" Relays especially designed for aircraft powered with 400 cycle cur-

rent. Other relays of this style are available for operation on 300 to 2000 cycles. The proven dependability of these CLARE relays has made CLARE the country's chief source of 400 cycle relays.

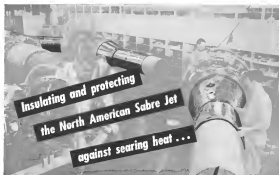
CLARE pioneered the manufacture of hermetically sealed relays for aircraft service and is still the leader in this field. Fifty and more different series of CLARE hermetically sealed relays are now available with innumerable variations of coil and contact specifications possible within each series.

For full information on CLARE relays for aircraft, address C. P. Clare & Co., 5719 West Sunset Boulevard, Chicago 38, Illinois. In Canada, Canadian Lugs Materials Ltd., Toronto 12. Cable Address: CLARELAW.

WRITE FOR CATALOG AND BULLETIN 124

CLARE RELAYS

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THIS PRODUCTION LINE SCENE at the North American Aerospace plant in Los Angeles shows Thermoflex® Insulation Blankets being applied to tail pipes of North American Sabre Jets on order for the United States Air Force.

New standard protection for many Air Force and Navy jet aircraft, these flexible blankets insulate and protect the airframe against searing heat generated by jet power.

Thermoflex Blankets are custom-fabricated with highly stable Thermoflex R-F Felt. This newly developed refractory fiber felt is sealed between sheets of corrosion-resistant metal foils. In manufacturing Thermoflex Blankets to specification, careful attention is given to the accuracy of contours for engine supports, airframe mountings, fuel lines, thermocouple leads and other contours. The precision-formed grooving



The North American Sabre Jet, shown at take-off. The General Electric J47 jet engine, hot flow through the exit of combustion, with higher thrust.

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PRODUCTS for the
AVIATION INDUSTRY

ponds on turbine bearings of pistonless turbojet engines as a procedure that is hard to duplicate, says Reschke. In fact, he said, while in practice, but not in theory, he asserts.

A second development that dovetails with the Center for aircraft pistonless engines is the Divertor Regenerator (read Blupper aircraft) system for cold weather starting, described in Aviation Week July 7, p. 64.

General Electric-Rohrbaugh first installed the Center in a jet while doing research for a landing aircraft engine modification.

It was by use of the Center in this work that he was able to obtain engine performance suitable to generate research data needed, Reschke claims. A Taurus engine, for example, and some testing units, promises a 50% saving for the latter and 20% for the former in fuel bills, he believes.

The Reschke plant lives up a part of the former Chance Vought facilities at Stratford.

Aero Transmission Drives Tested

A speed-saving rig utilizing low horsepower to test high-horsepower aircraft transmission drives under maximum performance conditions has been devised by the Technical Development Co.

The drive motor of the stand uses only 20-25 hp to test a gas turbine engine rotating 180 hp through full load, open and endurance conditions, according to the firm.

Gear cases can be tested without supervision for the length of time desired, the company says. Safety cut-outs halt operation if speed or past being tested malfunctions. Various transmission components like universal joints, couplings and drive shafting can be tested.

Technical Development Co., 22 Norwith Rd., Philadelphia 18, Pa.

New De-Icer Fluid

A non-flammable type de-icing fluid, claimed to eliminate the fire hazard of alcohol glycol antifrizz and to be two to four times better, was developed for aircraft use by Fine Organic, Inc.

The product, called "Starburst II," is said to embody entirely new principles of non-corrosion and frost prevention. Factors of corrosion, effluents on rubber, paints and other materials weighed heavily in its selection, the company notes. It says performance of the new compound is superior to alcohol glycol formulas conforming to Air Force Spec. 1609.

Fine Organic, Inc., 211 P. 16 St. New York 1, N. Y.

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Greer Makes New Test Stands

Greer Hydraulic has come up with several new models of test stands for the aviation industry. These stands:

- **Non-flammable fluid stand** ordered by KLM Royal Dutch and United Airlines for testing hydraulic components on the Lockheed L-1011, such as its double column inspection door on each in the DC-6 and DC-7. These are among the first stands built for Sky Jet.

The stand is a small model, 650-1500 VV ordered by KLM and a large, 1000-1500 VV ordered by United to provide a power source and to recover controls and components to prevent speed and accurate testing of hydraulic circuit components at pressures up to 5,000 psi and flow up to 3 gpm and 20 gpm respectively. There is a manual controlled interlocking valve and a non-collapsible column, and a float pump circuit for static and dynamic tests up to 10,000 psi.

- **Pressure test stand** developed by Greer in consultation with such firms as Republic, Boeing, Fairchild, General Motors and Lockheed on such progress as the F-84 jet fighter bomber and the B-47 jet bomber. Equipment has been delivered to Wright Field and to the Naval Gun Factory, San Diego.

It is composed in the main of either a booster cylinder on an air compressor with electric control, a valve and auto valve pressure regulator. An air line is used for manual control—static air circuit for pressure up to 6,000 psi and a vacuum circuit with a 2-inch, 9-cfm vacuum pump capable of pulling down 800 mm Hg and a vacuum chamber with a 700-in. in. capacity. Maximum flow capacities are 100 cfm at 5,000 psi using a booster cylinder. An alternately movable, automatic air motor and recovery controls and test

measures are included.

- **Improved Compressor test machine** is being applied to military services and distributed to foreign markets by United Aircraft Export Corp., an of United Aircraft Corp. This stand has been designed by Greer in cooperation with Hamilton Standard to test the latest double capacity, double inlet, reversible-girth and fully feathering propeller systems. The equipment has a 75-hp. drive and a pump providing pressures up to 5,000 psi. An adjustment enables the accuracy of the particular pressure under test.

- **Universal test for electric systems** components in aircraft, particularly power generating and control units, is a major development of the firm. Designated EL-100, it has a three-phase balanced load bank to test alternators and alternators, a direct current load bank, line loading equipment and related elements.

The company also is expanding its output of air bottles for pressurized tests, both powered and unpowered. They are available in capacities from one pint to 10 gal. Nitrogen is used because of its non-explosive qualities. Bottles are made of stainless steel, chrome molybdenum steel for 3,000-psi and 6,000-psi systems. The latter are tested at pressures up to 24,000 psi.

Greer Hydraulic, Inc., 454 Eighth Street St. Brooklyn, N. Y.

Fast Gun Camera For Speedy Jets

A new recording gun camera spot is being developed for use in high-speed jet planes is being delivered to the USAF. Labeled the N-9, camera is capable of operating at speeds of up to 64



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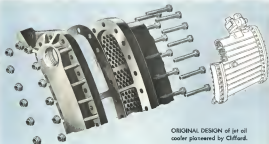
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forces per second, giving an exposure of 1/1,000 sec. Makes this a fast enough to stop the speed of light of p action, even when approaching from opposite directions.

The N-9 is made by the Holley Corp. of America which cites these features of the camera:

- Capable of withstanding gravity loads up to 25 Gs. with no effect on camera operation.
- Small size, about the size of a person's hand.
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- Bladeless single or double perforation film (50 ft. 16mm. magnesium, coated or about black and white or color).
- Withstand extremes of temperature from -60 to 160°F. Automatic heater prevents film from freezing.
- Adjustable exposure lens three set stops "low," "full," "bright" operate from remote control extension lens in cockpit.

Camera starts the instant gun begins to fire and continuously photographing after gun stop to record all action required.

Holley address: 115 120 E. 25th St., New York, N. Y.



From Mine Pit To Flight Line

United Air Lines inspectors now use camera type lamps to disassemble parts of aircraft they are inspecting. The lamps, designed for use in pressure tank atmosphere, are ideally suited for use around planes, especially in fuel tank areas. Lamps are equipped with two filaments of equal power (wattage) so light is furnished without interference in one or both ends.

If lamp lens and bulb break, contact at both ends is automatically interrupted so filaments cool off and become incapable of igniting a gas even at atmosphere.

The nickel-cadmium battery is reported to be unaffected by long idle periods, does not require constant recharging and lasts for years the entire

TAKES THE

★ PRESSURE OFF!



Fuel tanks suffer from pressure, too—may overexpand or collapse during extremes of high performance usage. Fuel Vent and Drain Relief Valves by Carter, to permit high performance, are standard equipment on the North American Navy F3-2 Fury and the Air Force F-86D Sabre Jet.

These special-purpose selected valves, designed and manufactured by Carter, are "fail-safe" and suitable for use in ambient temperatures of -65° to 250°F. Simplicity of operation assures dependability.



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IN THESE HYDRAULIC PUMPS made by Commercial Shearing & Stamping Co. all in contact between the parts of lean alloy steel. Carilloy is dramatically light, but the pump runs as tough and durable. Lean alloy steel also needs no oil and is resistant to wear and tear.

Commercial Shearing & Stamping Co., of Youngstown, Ohio, is another manufacturer who, unable to obtain rich alloy steel, is now using lean alloy steel for heavy-duty parts that must operate in extremely tough service. Here is their experience, as told by Mr. W. C. Kneis, Chief Engineer.

"We used to make the gears for our heavy-duty gear-type hydraulic pumps out of a rich alloy steel, Carilloy 4115 (1.65-2.00% nickel). But when nickel started getting scarce we had to find a steel in better supply that would stand up in really hard service.

"Our present operator of pressure as high as 3,000 psi and at speeds up to 2,000 rpm. Gear wear of only 0.005 inch seems a substantial drop in pump efficiency, so we need a tough, wear resistant steel for the gears. The question was, could we get the necessary properties in a lean alloy steel?"

"U.S.S. Service Metallurgists helped us out. They recommended Carilloy 5120, a straight-chrome alloy. We are frankly surprised at the excellent results we're getting with this steel. Not only do the gears meet all of our high performance standards but this lean alloy steel is easier to machine and heat treat. And we pay a lower grade rate on it. All told, the change to lean alloy steel saves us \$40 on every ton of steel we buy."

—W. C. Kneis, Chief Engineer,
Commercial Shearing & Stamping Co.

THE GEAR (in machine) slowly from steel to steel, lean alloy is better than steel.



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AIR TRANSPORT



CONSIDERABLE INVESTMENT (above) is made in new ASDE at Idlewild. The two scopes, right of center, belong to new Airport Surface Detection Equipment.

IDEAL WILD CONTROL TOWER (left) runs 318 ft above center of 4,000-acre terminal.

Surface Radar Being Tried at Idlewild

- Airport's new control tower fitted with equipment to aid in monitoring taxing aircraft.
- It's the first such application at a commercial field and is expected to speed traffic control.

By Philip Klass

Airport Surface Detection Equipment (ASDE), more popularly called "taxi radar," is being used for the first time to control scheduled aircraft on the ground. The installation is being tried at the recently dedicated N. Y. International Airport control tower ASDE, in a low-power, very-high-frequency radar specifically designed to show up objects on the surface.

The twelve-dollar control tower, called the world's largest and most modern by the Port of N. Y. Authority which leases it to CAA, stands 318 ft high, equivalent to an 11-story building. The structure is stressed to withstand 70-mph. winds and has an elevator to the seventh floor, from there it's a walk up.

The IFR (Instrument approach) control room, housing the GCA's navigation and precision approach radar scopes and operators, is on the seventh

floor. Radar transmitters and receivers are located on the eighth, and three floors above is the VFR control tower for fixed landing control. This room contains a duplicate surveillance radar scope and has no telephone connection to the IFR room.

Why Taxi Radar?—ILS and GCA as standard approach facilities have so specified an instrument-weather landing that the landing area at some airports is now the controller's ability to clear the runway and taxiway. That's where the new taxi radar should help.

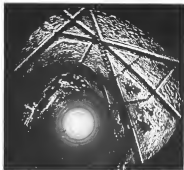
Airport Surface Detection Equipment gives the control tower a radar picture of all aircraft on the ground, airport runway, taxiway and fixed obstacles. The device will answer a precision need during night and instrument weather operations, but it will also be useful during daylight operations. As an airport as busy as N. Y. International (1,500 arrivals) with runway nearly two miles long, perspective viewing

makes it hard to tell an airplane's exact position on the runway, even from a 150-ft control tower.

ASDE Project—The ASDE at Idlewild is an Air Navigation Development Board-sponsored project under the direct supervision of USAF's Route Air Development Center. It was originally developed by Grifflin and evaluated by CAA at Indianapolis (Aviation Week Mar. 11, 1952, p. 75). Later it was turned over to Airborne Instruments Laboratory, Mahwah, N. Y., with a contract from RADG to investigate possible ways of improving present radar and ground performance. This was no reflection on Grifflin since the equipment was the first taxi radar ever developed.

The Picture—The radar scope picture resembles a relief map with roads and runways showing up as long dark areas from radar returns. To reflect the radar picture, a brightly-colored aircraft shows up as small bright blips against the black runway. Under favorable conditions the airplane's color, its shape with wings and tail discernible. Arrivals were not told during a demonstration at Idlewild.

All, and RADG, representatives busy about that there is room for improvement in detection, airport coverage and



RADAR PICTURE of Midway International Airport given by ANEM shows considerable detail, including images of DC-6 transports being re-ramped (right of center).



CONTROL, CONSOLE is instrument: Right rule lines on towers seventh floor. Precision approach and support surveillance rule tower are being considered.

reliability of the program and, it is already an experimental installation. ANEC and the USSR are officially impressed with the potential of, and need for, but rather that AEL has been given another incentive to develop a new and improved ASCE for Soviet Air Development Center.

RADC has assigned one of its technicians, Bruce Conway, to spend fall

lutina per second and generates a resonant-squared burst about $\frac{1}{4}$ degree wide in azimuth and about 9 degrees high in elevation.

The very short K-band wavelength used to give the ASIDE its good definition, makes it vulnerable to attenuation from precipitation. An Asheville, N. Carolina Laboratory engineer, Joseph Woodward says that one of the objectives of the follow-on installation is to determine how frequently heavy rain will deteriorate the radar picture sufficiently to make it unusable.

- **Autonomic Controller:** In addition to its main radio, the new control tower has more than \$650,000 of radio and radar equipment, including:
 - Fifteen radio sources (11 VHF, 3 HF, and 1 A3A).
 - 11 VHF transmitters (each capable of operating on any one of five channels).
 - Ten remotely located transmitters (one LF, one VHF) have connections to the tower.
 - Seventy-five telephone lines (for communications to other CAA control points and the military).
 - Sixty-collared and approach radars.
 - Three separate electrical power systems.

Engineer Station
Ruled Out for DC-7

Although airline pilots and flight engineers have proposed that the Douglas DC-7 have a segregated instrumented flight engine station, American Airlines, United Air Lines and Douglas Aircraft Co. are dead set against the proposal. An AA official says it is out of the question.

The DC-7, like the domestic versions of the DC-6 series, accommodates the flight engineer with only a jump seat between pilot and co-pilot. He reads three instruments.

Flight engineers and some pilots note that the high performance of the DC-7 and its compound engine warrant a separate engine station such as on Pan American and TWA over ocean planes. This, they agree, would slash the pilots' cockpit instrumentation by removing secondary controls and is essential to the flight manager station.

But the airlines and manufacturers say this would require major rework of the DC-7 at prohibitive expense. One of the major advantages of the DC-7 is its DC-6 series lineage, giving power-control setups. Aside from the expense, they say another disadvantage would be the risk of radical changes

The jet transport of the DC-8 series will be fine to change to a first class seat station on domestic routes, as American Airlines officer told Aviation Week.

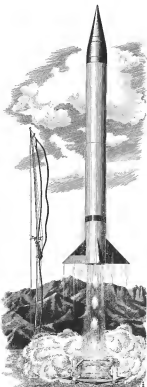
Research Rides a Rocket

The Naval Research Laboratory's Viking rocket research at White Sands Proving Grounds, N. M., hunts facts, figures and formulas in the upper atmosphere.

Hovering into the blue, Naval Research Laboratory scientists ask questions of the earth's upper atmosphere. . . . Back back the answers needed to guide the dangers of tomorrow's plotted and plotting super-sonic systems for peace or war. What are the temperatures and temperatures of the earth's atmosphere layers. . . . the high altitude changes in the earth's magnetic field affecting navigational instruments. . . . the alterations in radio waves caused by the ionosphere. . . . the effects of sun spots on communications equipment out beyond the filtering effects of the earth's heavy atmosphere.

Martin Viking rockets play a major role in this high altitude flight research program. Last summer, the Viking reached the world's stratosphere record for single-stage rockets — soaring 135 miles into the heavens at a top speed of 4,700 m.p.h. Now, an even more powerful Viking is being readied for launching. The Martin Company is proud to be a partner with the Naval Research Laboratory in these vast activities — helping to prove that America's most valuable secret weapon is its scientific leadership! **THE GLORIA L. MARTIN COMPANY, Baltimore 1, Md.**

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Pilots Take Look at Convair 340

The Convair-Lear 340 appears greatly improved over the smaller 240 but still needs a few major modifications, an experienced pilot reports. One of the comments: L. Homer Menden of Mid-Continent Airlines, summarizes three light test findings to the current issue of the Air Line Pilot Association publication, the "Air Line Pilot."

Chief modifications recommended: •More leathering control. Feathering buttons and warning lights are on the cockpit rail. Pilots want them lowered to the far right-hand post where rotation is easy. Prop feathering is a logical function of the control system, Menden says.

•The mixture control. On the throttle quadrant, there is a possibility of pulling back the mixture control lever when you want the carburetor heat lever. United Air Lines has installed a locking device to prevent such control cut off on the fuel mixture and carburetor heat.

•Improve flap position indicator. Pilot Menden recommends installing a bag on the lower forward flap position indicator. Flap position is critical on most low high-performance transports, he points out.

•More test light. The 340 test light is on the overhead strut so it can't be used except in taxiing and final approach. The pilot's instrument room needs more test light to the plane's nose because they're at more in flight than in taxiing. They find it useful for checking gear, preflight identification and so on.

These are the most important modifications recommended by Menden to eliminate after the pilot certificate evaluation.

Some major items noted, indicated generally, satisfaction performance and degree of the pilot.

•Bigger taxi and landing gear for smoother landing and taking in all weather.

•More powerful engine, the R2300 CB40, gives full 2400 hp at takeoff with more reserve thrust left, permitting maximum allowable power for landing and high-altitude takeoff. Lack of this was a weakness of the C441 on one, Menden says.

•Excellent visibility in the new cockpit may be "due in part to the ALPA committee's suggested changes to the original cockpit layout of the 240 during design stages. This simplifies the importance of pilot participation in aircraft transport design," notes Menden.

•Quick cockpit.

•Throttle warning horn to prevent inadvertent throttle in a good safety device, as the Convair is not certified for one step takeoff. "Such a warning device is not necessary of small cockpit spacing," Menden comments.

•Exhaust use for heating of cockpit, cabin and wing and tail sections, a "high, fast" in ALPA over the conventional heaters compounds and, he notes, manufacturers. And the 340's improved controllability of the tail and "stable" results the 340 to handle a lot more sea than does the 240.

•Automatic light fixture to be placed just the vertical bar "gratified" the pilots. The light is not installed yet, but United Air Lines is producing one.

•Increased wing dihedral improves fuel efficiency.

•Still characteristics are good. Menden says. Preflight warning is adequate, since cockpit remains open during the stall and the pilot "did not want a tendency to 'step' in power-on stalls."

Menden concludes "It is an excellent characteristic are expected during scheduled operations, the 340 should prove a very efficient and economical airplane, one that the pilots will enjoy flying."



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Navy Presses CAB To Switch to Knots

Navy is putting the best on Civil Aeronautics Board to go ahead and standardize civil on navigation air knots and vertical miles to 1000 meters planned before heading down last June under industry pressure.

Assistant Navy Secretary for Air John Flieberg says that in very much increased over the failure of the CAB to adopt the metric rule and later in standard units of measurement for an traffic control in the United States.

"Without standardization in procedures and in traffic control equipment, safety in flight will be reduced on a rapidly decreasing scale," Flieberg adds. Then he explains that this will hurt airlines, business, saying that the "implications" of the decreasing scale of safety "as the prospects of increasing air travel by the people of this country are obvious."

•Aph. Outcomes? He adds that with a linear standard, based on such measurements, standardization in the length of time, power of fuel, or the length of the wing's arm, may have satisfied all the requirements of the Civil Aeronautics Board in 1965 and 1966.

But we greatly lack, for example, standard purposes in the use of high speed and long distance air travel.

The critical link and the best "as the only simple, practical and logical words for any navigation words of the metric," Flieberg says.

"The Air Conditioning Committee," has recommended its adoption throughout the U.S. in the interest of safety and expansion in building air traffic." The International Civil Aviation Organization, the United Nations and other agencies such as the Civil Aeronautics Board and Western Bureau have all standardized in the last. On the CAB has not.

Civil Aeronautics Administration started working against a year ago that the last would become standard.

•CAB. Re-authorized in a hearing shortly after the job. It decided to switch over, Air Transport Association CAB of short cutting due process of law by committing the industry to knots at the high policy. AGC local without getting full industry opinion. At its operations managing vice president Milton Arnold announced the Board with this action and recommendations of 100,000 passengers told the Board that it was the only way to do it.

The Board's response, however, in field and concluded the last standardization in order. Further combining surface on either side half of them already converted to knots and leaving the armed services, but a double standard was given when in the U.S.

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COCKPIT VIEWPOINT

By Capt. R. C. Bolson



Fear, Headlines & Safety

No factor stands the growth of an trend as much as the fear of death. Evermore has intelligent, average income neighbors who continue to travel by air, but remain because they consider flying dangerous.

Most of this fear, of course, is unwarranted. The industry can produce all sorts of statistics proving otherwise. But somehow these figures don't seem to have much impact on the most fearful. It is possible that some day these headlines will not be considered front page material so often, and some of the "news" may be taken out of context. Then, however, is a doubtful time.

► **Crashworthy Aircraft**—A more pressuring industry would seem to be to make the companies safer by making the aircraft more crashworthy. This point is hardly a new one, but action on it has lagged terribly.

Consider the passenger seat. The enough attention has been paid to it? Have the design and strength of seat belts and seats, the padding and seat spacing been considered primarily in the light of injury and economics as of safety? And the seat facing out—this has been looked around for years. Some say "People will not like this," so proof that we are better," will not help until the crash is straightforward. One. Some of the reasons, a carrier, certainly one of the advances of marketing seats do not call them a passenger. But let's look at it another way. How good are present seats? Can we live by making a change?

Several past accidents have found a large portion of seats piled up in the forward part of the cabin, effectively blocking the exits.

Seat belts, too, have been known to leave their point of origin and produce untold trouble. It does not require much imagination to see that this catastrophe need be prevented. Perhaps seat belts should be anchored directly to the frame of the aircraft in such a way that should be shown with better belts, the method is unimportant.

► **Crew Training**—Free after only a smaller will have been issued. It won't long ago that a DC-8 burred across a field in Philadelphia and based up—100 people. This leads one to ask, "How long can an airplane fly?" It also makes one wonder what happened to the talk about softening fuel tanks and what about automatic extinguishing systems and crash catches which turn off the electrical and turn on the fire suppression?

The difference between life and death is some accident hangs on the precise timing of crew and cabin attendants. It would be interesting to know what percentage of these people have had a worthwhile course in emergency procedures and how often they are reviewed. Some of them, of course, do wonder how. They even have the gas pump down, and pump them on fire. On the other hand, some do not. The timing of opening personnel in these matters should be a must.

The point of all this is that we are new building airplanes which can carry upwards of 100 people, we wonder how the industry will survive headlines with figures in three digits!

The need of today's "conventional" pilots is good, but can we make it better? It is interesting to ponder what would happen if some more females, despite the dire predictions of the public relations "experts" and the psychologists, were asked and built a new airplane incorporating all the latest safety features.

Some of the content in this article was stated as though it comes from Civil Inquiry Research of Cornell University, et al. Few believe from the aviation industry stand as dangerous practice as do those of Mr. Hugh De Haves & Co. If this article may be permitted a recommendation, it is that anyone in aviation should read the work.

WHAT'S NEW

Telling the Market

Samples available from many Rotabro (including shoring) in five parts, books and materials are described and discussed in 10-page color catalog, "The Science of Rotabro Self Storage," available from Frick-Gallagher Mfg. Co., Walla Walla, Okla. — Catalog No. 600001, 24 pages, covering general shop activities, methods of using, methods and least type and may be had by writing Micro, Placerville, 12, division of Minneapolis Rotabro Register Co.

► **Flowchart**—Flowchart is a widely distributed brochure providing background on origins, growth philosophy and principles guiding Aircraft-Martin Products, Inc., Harrisburg, Pa., maker of interline wiring devices and tool cabinets.

► **Designing, cutting and punching** operations in medium and light weight materials handled by DeVaco manufacturing machines is described in 12-page booklet which can be obtained from Q-Ind. Corp., 5100 5th Ave., Lake City, Minn.

Small catalogues services offered by the Duffin Corp., 630 S. 21st St., Irvington 11 N. J., are detailed in folder being mailed to anyone. Characteristics of silicone rubber and chart materials for physical properties of 22 leading types are contained in booklet, Silicone Tech. No. 10, obtained by writing Duffin Corp., Irvington, N.J.

► **Prepared for analysis and use of** earthmoving equipment is bulletin D-1506 describing portable adjustable speed drive unit with electronic control to solve various problems in the power sector. Write: Rockwell Electric & Engineering Co., 1085 Fenwick Rd., Cleveland, Ohio.

New Books

► **Art Navigation, Theory and Practice**, by E. Frank Williams and W. J. V. Jones. Profusely illustrated with charts, maps and text, 644 pages, including index. Published by Sir Isaac Pitman & Sons Ltd., London. Price 75 shillings (about \$7.70).

This is for the advanced student who plans to solve aviation navigation problems, and as such is a very thorough and up-to-date navigation textbook. There is a good, long chapter on navigational instruments for example, which gives considerable detail in their construction and how they work, as well as how to use them in preparing calculations. Radio devices also come in for much discussion. But not only chemical devices, but natural devices, are covered thoroughly. —EPP

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Airfreight & Defense

Friction between several members of the Civil Aero Council Board and their Chairman, Donald Noyce, has triggered a refreshing change in support viewpoints on several civil subjects including international air cargo.

Indisputable among the assemblage over the extent to which the Chairman and the director of the staff conduct the agency's business without members' knowledge is reaching a close, but

There is strong belief that these members are hearing in the much deeper who pending cases, rather than to depend entirely on the material that is filtered to the from some of the Board staff.

The stiffening opposition to the Chairman is the unhappy members thus being a much more liberal and sophisticated viewpoint, based on much more vigorous and independent reasoning, and are welcome to stand up and fight.

So that while the so-called trans-Atlantic airfreight case was decided under a Board of impartial disinterested membership, under another Chairman, the present members may make the most of the opportunity to revise the decision. President Truman recently rejected the decision and ordered the Board to reargue the case. An earlier Board had turned down both Seaboard & Western and Transocean for certificates to the Middle East.

After the White House returned the decision, Board members were described as embarrassed because some of them had never been shown certain correspondence sent to an earlier Chairman in the Defense Department favoring more cargo service in the national interest.

An additional blow in July, contended that the Board had feathered away the country's commercial air cargo leadership over the Atlantic by its staffing tactics and then by its negative decision, and it was pointed out that foreign carriers were running ships around Pan American and TWA air cargo operations between Europe and the U. S. It also noted that study was Britain had just revised its policy to encourage independent, commercial air cargo companies to set up new routes.

A few weeks after the official appeared both TWA and Pan American announced taken cargo service between the U. S. and the Middle East—the same area that the two unsuccessful applicants had asked to serve.

The systematic replacement of the Defense Department correspondence in Board files, without being sent by several Board members, may have been accidental, but the shoddy manner in which the decision lined off the national defense value of new cargo service could not have been accidental.

The Defense Department made clear its attitude on Jan. 12, 1955, when Stephen Early, an Deputy Secretary of Defense, wrote Chairman O'Connell:

"There is considerable military interest in the expansion of the civil air transport industry to the fullest practicable extent, and we believe that the development of new markets of this sort can be effectively instrumental in achieving this end."

"The department feels that adequate national management can be given to the military industry will be of essential military interest, in language, all purposes should be particularly applicable to military requirements in the event of an emergency."

In addition, continuation of a service of the sort (the U. S. trans-Atlantic Mobile Post) would provide a valuable means to the Department of Defense of offering defense of priority cargo. For the above reasons, the department favors the continuation of an all-cargo service in the near future."

This was the letter that was paraphrased.

Eighteen days after the decision was served, Mar. 12, 1952, Defense Secretary Lovett wrote Mr. Noyce reaffirming the department's interest in expanding commercial air cargo.

"The department would like to point out, as is the past, that the problem and operation in the air transport industry of long range, transport in cargo configuration is in the interest of national defense. The military establishment demands the possible type of aircraft, together with experienced operating and maintenance personnel to be an important contribution to the end service as fast as possible in case of emergency. A well-developed trans-oceanic air cargo industry would be of national assistance in meeting various military needs requirements."

It should be emphasized here that Mr. Lovett specified aircraft "in cargo configuration." The passenger airlines of the country have virtually no military all-cargo planes. Their hundreds of passenger transports could not be adapted immediately to emergency military cargo. Yet Civil has consistently represented the formation of a new all-cargo system in U. S. flag, international operation, put it off hold off for so long in conducting new domestic freight carriers.

Amplifying the Defense Department's position, the Air Force's Directorate of Plans has consistently reaffirmed the attitude expressed in Mr. Early's letter.

It was developed later after CAB interested its landy decision to the White House, that the President consulted the Defense Department. The Air Force is said to have changed strongly with the Board's rejection of certificates.

The record of the trans-Atlantic freight case offers a lot of Air Force testimonials to the apparently emergency cargo and passenger transport and over the world, if Board members care to read it!

The foghorn of the Board's vision in comprehending future possibilities of commercial airfreight has been exceeded only by its total blindness to the country's national defense needs. It is to be hoped that the Board members in their recent rebellion will see the light and meet their obligations.

—Robert H. Wood



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